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EXPORT TRADE AND ENEMY INFLUENCES.

IT was announced last week that the Foreign Trade Department had just published a consolidating statutory list containing over 1,500 names of firms of enemy origin or association in foreign countries with whom persons in the United Kingdom were forbidden to trade, and that additions to the list would be issued at frequent intervals. Naturally, these lists are primarily intended for the information of British manufacturers and exporters during the period of the war, although they should also be of great advantage on the conclusion of hostilities in the sense of deterring, as far as possible, British firms from resuming trading transactions with these now enemy firms or individuals. Simultaneously with the publication of the new statutory list comes the announcement from Washington that neutral Powers have proposed that the Government of the United States should take the initiative in negotiations for the purpose of the adoption of some form of concerted reprisals against the black-lists. We do not think, however, that the United States will fall into this fresh snare which has obviously been laid by, or at the instance of, German agents, notwithstanding the large Teutonic population in the United States. So extensive, indeed, is the German element in that country, particularly in commercial and financial circles, that it is often difficult for outsiders to determine from names of firms whether they are American, German, or German-American, and it is equally difficult to say offhand whether individuals with German names are really German, or whether they are naturalised citizens of the United States. Similar observations also apply to the South American Republics, and to Holland and the Scandinavian countries in Europe, where German names, and foreign names adopted by Germans in order to disguise their nationality, are to be found in abundance.

It is, however, not our purpose to discuss the question of nationality. We have merely set forth what has preceded in order to emphasise the enormous ramifications of the German element throughout the world, and to show superficially what British manufacturers will still have in front of them in the future period of peace. But, with the assistance of the statutory lists and the information which is being collected by the various committees appointed by the Government to consider the subject of British trade after the war, it should be possible successfully to resist the threatened resumption by the Germans of a great commercial onslaught in the markets of the world in the future. Although the Germans occupy the premier position for mendacity in political matters, and may also hold the same status in commercial and trading affairs, we cannot entirely reject as being totally devoid of foundation the reports emanating from Germany as to the accumulation of stocks, even under present conditions, in readiness for disposal at any prices obtainable in external markets when normal conditions have been restored. Such a state of affairs, however, cannot prevail to any large extent in regard to the German electrical engineering industry, in consequence of the comparative scarcity of copper and other metals which have been requisitioned for war purposes, although we believe that

copper is still being produced in the country at the rate of 42,000 tons per annum. At all events, one company, which annually produces 22,000 tons, reported an output of this quantity last year, and the other copper producers may be expected also to have turned out their normal tonnage owing to the pressure of the Army authorities. But this in no way disposes of the fact that all the copper is needed for military requirements, directly or indirectly, and that none can, therefore, be available for the manufacture or construction of plant solely for peace purposes.

The immediate ability of the German electrical firms to dump large quantities of their manufactures in the world markets directly after the war, even if shipping be available for such a purpose, need not be regarded as so threatening a factor as in the case of some other branches of trade, and the official lists of enemy firms should assist us in our efforts to prevent later Teutonic competition from being successful. As we have repeatedly shown, however, much will depend upon the ability of other nations to meet the world's requirements. Our reference to the German influence which is present in parts of the industries of the States, reminds us of some recent comments of the *Electrical World*, in which our contemporary shows that, though the world is thirsting for electrical goods, "American manufacturers have not taken advantage of the opportunity to supply the markets of the world" with them. The export electrical trade of the world in 1913 was, according to the writer, in the neighbourhood of £25,000,000, but in 1915 it was only £10,000,000, first, because Germany was shut in by our blockade; secondly, because there was a certain falling-off in the world's purchasing power; and thirdly, because our factories and our ships were otherwise occupied. Some of these effects were, when war broke out, expected to afford America just that opportunity as an electrical exporter that one would have expected her to desire. But, according to the *Electrical World's* comments, that opportunity has been allowed to pass. Whether the cause be the pre-occupation of American industries with their great prosperity, or whether the German hyphen and the indisposition to enter a market which there might not be a desire to hold after the war had any influence on the situation, the fact remains. We hope that the British electrical manufacturer is fully alive to the necessity for preparing for the production of that greatly increased output and for energetic export-selling propaganda and efforts to enable him to handle a good share of the business that is represented by that accumulated deficit of exports of the war years, much of which will require to be provided in addition to the normal export trade.

Foreign Undertakings in Russia.

Although sequestrations of the property of foreigners in Germany have been numerous during the course of the war, and foreign businesses or companies have been extinguished, the Teutons do not particularly enjoy reciprocal treatment in other countries. The German idea is that if the Teutons establish a company in another country, and under the laws or authority of that country, it becomes a native company, even if most, or all, of the capital is held in Germany. But the allied nations no longer intend to allow this subterfuge to prevail. In the case of Russia, it appears that an Imperial Order was recently issued deciding on the determination of the Kieff Electricity Co., and stipulating that the liquidation should be carried out by a committee appointed by the Government and the Kieff Town Council. If this action should be carried out, a German newspaper remarks that it would represent a contravention of law, as the company is a Russian concern and, according to its statutes, liquidation can only be brought about by a resolution of the shareholders. But when it is mentioned that all the shares are held by one company—the Berlin Electrical Undertakings Co.—no ground exists for the Teutonic protest, as the elimination of the German element as far as possible now forms one of the definite items in the programme of the allied nations. At the same time, it is impossible to refrain from drawing attention to two other matters in which neutral capital in Russian is mostly concerned, although as the information is derived from another German source its accuracy is open to suspicion, particularly when applied to neutral countries. Both cases refer to Moscow, the Town Council of which has endeavoured to expropriate the local undertaking of the Petrograd Electric Lighting Co. of 1886. The first relates to the Belgian Electric Central Station Co., which sought a concession to compete with the former and lodged a deposit of £100,000. It is now alleged that the Moscow Town Council has declared the contract with the Belgian company to be dissolved, and the deposit forfeited through non-fulfilment of the agreement. In the second case, the Town Council is said to be opposing the prolongation of the concession of the Swedish-Danish-Russian Telephone Co., in which neutral capital is principally interested. It is known that the Germans take pleasure in attempting to sow discord among the Allies, and between the Allies and neutral countries, and the present examples may represent further efforts in this direction. At any rate, if any excess of zeal should be manifested by the Moscow Municipal Council, which has already experienced the steadying effects of the Government in regard to the proposed expropriation of the local electricity works, it is probable that the Ministerial Council will only permit of the adoption of such measures as would be justified by the circumstances of each individual case after mature consideration.

Rubber.

Within the last few weeks the price of crude rubber has had frequent and erratic fluctuations, but the outlook remains very much involved. What with political and war uncertainties, and the fact that the manufacturing trades over the summer months are usually in a more subdued condition, while buyers do not care to anticipate their needs far ahead, the future course of the market is rather problematic. In the earlier part of the current month there was no mistaking the prevalent feeling of depression, while considerable quantities of unsold plantation rubber were awaiting disposal on the spot. Prices fell to about 2s. 2½d. for No. 1 latex, but recovered at one time to nearly 2s. 5d., which has been followed by a renewed break, although the market has latterly shown more staying power, thanks to evidences of an improving demand from the home trade and for export to the Continent. The more recent buying was more centred on smoked sheets, the value of which description has ruled comparatively firmer, and now stands practically on a par with No. 1 crepe. There has been more interest, too, in the lower-priced grades of crepe rubber. The June imports were comparatively small against the same month last year, with the receipts from wild rubber producing countries again disclosing a falling off, and the Liverpool and London stocks showed an appreciable reduction, but recent arrivals have been more liberal, and the supply is seemingly, on the whole, keeping well ahead of the demand, so that there is not a very hopeful feeling as to the stability of the market, although prices are relatively low. Holders of spot rubber seem rather keen to lighten their stocks, and buyers are cautious. The absence of any American revival of inquiries is undoubtedly

being felt, and until buying from that quarter re-asserts itself, unsettled conditions must be expected to continue, though the worst of the depression has credibly been seen, judging from the fact that prices for next year's deliveries remain at a fair premium over the value of spot rubber. Whereas the recent exports to American ports were relatively small, as compared with the abnormally heavy returns in the same period last year, the quantities sent to France and to Russia were of respectable dimensions, and prospects as regards the outlet in these countries are considered pretty good. Home consumers seem more disposed to lay in stocks for future needs at the present level of prices, but trans-Atlantic manufacturers are, apparently, still drawing on their old stocks, as usual, till towards the autumn. There is evidently less anxiety in that quarter as to future supplies, while fairly large quantities are on the way. It is estimated that the Eastern shipments for the past month were about 9,200 tons, making an aggregate of, roughly, 55,000 tons for the first half of this year, comparing with about 6,000 tons and 41,000 tons for the corresponding periods last year. There has been more doing lately in Brazilian descriptions, and the price of hard Para has risen to a rather stiff premium over the value of best plantation rubber. This feature is somewhat puzzling in view of the keen competition of plantation grades, although it is chiefly due to the limited supply available.

Industrial Fatigue.

A few months ago we drew attention in these columns to the importance of the study of industrial fatigue, in connection with the conditions of working under high pressure which have been brought about by the war, and to the excellent Memorandum issued by the Health of Munition Workers' Committee on this subject. The report of the Chief Inspector of Factories and Workshops for the year 1915, which was recently issued—a mere shadow of its former self, owing to the exceptional demands upon a depleted staff—contains some interesting references to this matter, showing that there seems to be a more general recognition of the advantages of a week-end rest. Sunday labour has been found to be unsatisfactory; not only has it a detrimental effect upon the physical condition of the worker, it also often results in loss of time on other days of the week, and the Ministry of Munitions considers it preferable to work a moderate amount of overtime during the week, with a break on Sunday, rather than to work on from day to day. Where possible, work is conducted continuously on a system of two or three shifts, though the shortage of skilled labour has necessitated working overtime in some cases; but the Home Office keeps a tight hand on the amount of overtime allowed. It is pleasing to note that, in spite of the long hours and continuous pressure, no evidence has been observed (except in the case of foremen and managers, and some of the older workmen) that the strain has produced any ill-effects upon the workers; there have been indications of fatigue, but this is quickly overcome by a temporary rest from overtime, and the system of watching workers and affording them temporary relief whenever undue signs of fatigue are shown is recommended by the Home Office.

The great improvement in the care devoted to the welfare of the workers, the provision of canteens and mess-rooms, and arrangements for dealing with cases of injury and sickness, are welcomed by the Inspector as most important developments which are likely to remain after the war; as Miss Anderson, the principal lady inspector, remarks, these reforms are partly due to the "general awakening to the dependence of efficient output on the welfare of the human agent." We trust that the lesson will never be forgotten.

NOTES ON ELECTROPLATING.

By S. V. THORP.

(*Concluded from page* 61.)

Vats and Tanks Used in Plating.—The plating-vat may be constructed of either wood or iron. For nickel, silver, cold brass, copper, or zinc solutions, a wooden vat is used, having an outer casing made of deal or pine of suitable thickness, grooved and feathered and bolted at either end with iron plates. The whole is then lined inside with chemically pure lead, and the joints are burnt, not soldered together, as soldering introduces tin, which will injure the solution, and may set up electrolytic action in combination with the lead. Inside this is a lining of match-boarding, which is fitted in loose to allow for expansion when filled with liquid; otherwise it would burst, due to its swelling. For hot solutions of brass, copper, tin, or zinc, an iron vat is used, in which the solution is kept hot by means of a steam coil placed at the bottom of the tank, the number of convolutions in the coil being arranged according to the steam pressure and size of tanks. When an iron vat is used a wooden frame should be placed on the top, and earthenware insulators are fixed to carry the brass rods, from which are hung the anodes and articles to be plated. The anode plates for the vats are sometimes cast or rolled, but in all cases they must be perfectly pure, and they are hung on the rods with hooks, the shape of the plates and hooks

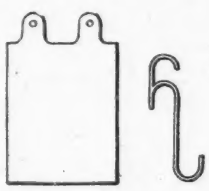


Fig. 1.

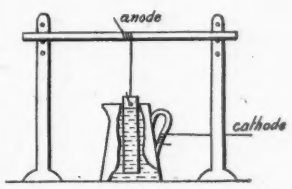


Fig. 2.

being illustrated by fig. 1. The scouring and swilling trough is made of wood, and lined inside with lead, a constant supply of water from a tap or pipe being run into the trough. The dipping pans are usually of stoneware, and vary according to the work. The potash, or cleaning, tank must be made of iron, the best quality being essential, owing to the constant heating required. The sawdust pans are made with a false bottom to contain water, which, while keeping the sawdust hot, prevents it from being burnt.

Cleansing of Articles before Plating.—Before articles are plated, they need to be chemically clean, or the deposited metal will not adhere to them properly. For this reason, after the article is received from the polisher, it is wired and placed in the hot potash tank, and well rubbed with a mop, to ensure all grease being removed, such, for example, as may be due to handling. On being removed from the cleansing solution, the article should be well scoured with pumice powder and water. It can then be placed in the plating vat, but since an almost imperceptible film of oxide may have formed on the surface of the article, it is advisable to dip brass or copper articles for a second or two into a cyanide dipping solution; this ensures the deposit adhering firmly. For iron or steel articles it is better to use a hydrochloric acid dip, and for cast-iron the hydrochloric is replaced by sulphuric acid.

The process of cleaning work preparatory to plating by an electric current has proved successful, and it is being adopted in works which have to deal with large quantities. The solution, which is worked hot, consists of special salts; the anodes consist of carbon, and the resistance board is so constructed that the current may be reversed without removing the articles from the vat. The work is wired as for plating, placed in the vat, and the current adjusted so as to cause a rapid evolution of gas at the work being cleaned, and as this rises to the surface of the solution it will carry with it grease and dirt in the form of a dirty scum. As soon as the work appears discoloured, the current must be reversed, and the work becomes the anode. This reversing of the current removes the oxide

formed on the surface of the work, which will appear quite bright and chemically clean. When removed, the work is well swilled in cold water, dipped for a second or two into one of the acid dips, according to the material of the work cleaned, and then transferred to the plating vat.

Nickel Plating.—Nickel plating is, perhaps, carried on by manufacturers more than any other plating process in connection with their other processes. Assuming that we have some articles to plate—for instance, the parts of a cycle—as received from the polisher, they will be sure to have a fine film of grease upon the surface. The articles are wired and are then hung in boiling caustic potash, well rubbed with a mop, taken out, and well swilled in cold running water. They should then be thoroughly scoured with pumice powder and water; when finished, the water should hang to all parts of the articles in the same way as oil would. The articles in this case being steel, are dipped for a second or so in the hydrochloric acid dip, rinsed thoroughly, and immediately transferred to the vat, with the current on, and left for one to three hours according to the thickness of deposit required. If the solution, which is worked cold, be agitated, the articles will only require to be in the solution half the time required in a stationary solution. Whilst the deposit is going on, the rods should be occasionally lifted or tapped to release the gas which forms on the articles, but where the solution is agitated, the tapping of the rods is not required. The articles are now removed from the vat, swilled well in hot water, then rubbed dry in sawdust, and if the work is properly carried out a rich silvery deposit is the result.

Nickel plating is done directly on iron or steel, but for high-class work and certain special goods it is best to copper-plate the article first. To do this, the article is prepared as for nickel-plating, then placed in the copper vat, and when the desired thickness is obtained, it is taken out, well scoured, rinsed, and placed in the nickel vat. This gives a much better looking deposit, and one that wears better than a nickel deposit direct on the steel or iron. In re-plating, it is always advisable to remove old nickel from iron or steel by polishing, or a much quicker and simpler method is by using a nickel stripping solution, which in a few minutes strips a coat of nickel which may have taken an hour or two to deposit, and, moreover, does not damage the article, as in other processes. In these cases, the work to be stripped is used as the anode, and the cathodes must be of sheet-lead or carbon.

Copper and Brass Plating.—In copper and brass plating the preparation of the articles is the same as for nickel-plating. For coppering there are two well-known solutions, the acid copper solution, which involves the use of copper sulphate crystals, and the copper cyanide solution, in which copper carbonate and potassium cyanide are used. With the acid copper solution, excellent copper can be deposited on copper, brass, lead, or metallised moulding materials such as compounds of wax, but not upon steel, iron, tin, zinc, or metallic alloys which are more electropositive than copper, and for the latter it is necessary, first, to copper-plate in the cyanide bath, afterwards transferring to the acid bath. Although for a given deposit in the cyanide bath more electrical energy is used than in the acid solution, the rate of deposit per ampere-hour is just double. The cyanide bath should be worked hot, about 135° F., as it has an extremely high resistance at ordinary temperatures. By adding zinc carbonate to the copper cyanide bath, a brass deposit of varying colour, depending on the amount of zinc present in the solution, can be obtained. The best results for electro-brassing are obtained by first giving the articles a coat of copper; when well coated, scratch-brush, and place in the brassing vat till the desired thickness of deposit is obtained. In using potassium cyanide or its solutions, great care is needed, as it is a strong poison, and blood-poisoning will probably result if a cut or scratched hand comes in contact with the solution.

Silver and Gold Plating.—For silver plating, the solution consists of silver chloride dissolved in potassium cyanide. The work is prepared as before, only before being placed in the silver vat the articles are dipped in an amalgamating solution composed of mercuric salts, for a few seconds, until they show a whitish appearance, then well swilled in water, and placed in the silver vat. After being in the solution a few minutes, and coated over, they are taken out, swilled, and scratch-brushed, immersed again in the amalgamating solution, and put in the silver vat till the required thickness is obtained. For gold plating the electrolyte varies greatly, depending on the class of work and the colour desired, &c. Gold baths are usually made by dissolving gold chloride in a potassium cyanide solution. In plating with cheaper metals, the anode surface is large enough to keep the solution up to full strength, but in gold plating this is not always the case, on account of the high cost of the anodes. They are usually much smaller than the article being plated, and the solution is consequently reduced in strength as plating progresses, so it is necessary to watch the bath carefully, and to strengthen the solution from time to time. Some baths are worked hot, and some cold, and the proportion of gold necessary depends on which method is used. With a cold bath the stronger currents give the darker deposit, while in the hot bath the temperature determines the colour, the higher temperature giving the darker colour.

Electroplating with gold requires great skill, because the metal is so valuable that the plater must use every means possible to produce the required results with the least possible amount of metal.

Zinc Plating.—For the electrodeposition of zinc, the solution can be worked hot or cold. Cold electrozincing or electrogalvanising is perhaps used most, and is specially suitable as an "anti-rust" coat upon articles such as screws, washers, staples, tubes, rods, &c. The deposit is clean and smooth, and if a dull finish is required, the article has an excellent appearance; if a bright finish is wanted, scratch-brushing following the plating gives the required brightness.

Barrel Plating.—The mechanical plating of small articles in a revolving barrel is a great saving in a shop where large quantities of small articles are constantly being plated, as the articles do not need to be wired, which in itself is a great saving in time and labour. The barrels revolve at from 15 to 30 revolutions a minute, depending on the size, shape, and number of articles put into them, but in all cases there must just be a sufficient number of articles to allow them to roll, but not to be carried round with the barrel. The barrels are usually constructed with wooden bottoms and perforated celluloid sides, the perforations being of such a size as not to allow the articles to fall out. The barrel in some types is raised and lowered by means of a rope and pulley block, the articles being emptied into a sieve. A very good arrangement is to have the apparatus so arranged that, after plating, the barrel can be turned right over into a swilling tank and revolved in it by the same shaft, thus preventing all risks of articles becoming stained due to their not being thoroughly rinsed.

While articles are receiving their deposits, the continual rubbing gives them a high polish, and the deposit is also close in grain, due to the constant rubbing, making the deposit more durable.

It is impossible to get articles burnt by this process, and the anode surface should be as large as possible, owing to the large amount of surface of the articles in the barrel. For drying-out purposes, a revolving sawdust barrel is sometimes employed; the barrel is so constructed for the special purpose of keeping the sawdust hot and dry during the whole process of drying-out. It has an inner and outer casing, between which is water to prevent the sawdust from burning.

Method of Plating Inside Metal Vessels.—To plate inside metal vessels, such as jugs, sugar-basins, presentation cups, &c., fig. 2, the article is filled with the solution, and the anode-plate is hung by suitable means inside it. If the edges of the article are defective, as they sometimes are, and to provide for plating at a point not reached by the solution, a method known as "doctoring" may be practised, by which the anode—or a portion of it—is swathed (with a piece of stick to stiffen it) in a few coverings of calico, and attached to the + pole of the generator, while the article to be doctored is attached to the — pole. By continually dipping the covered end of the anode in the solution, and gently rubbing over the spot to be covered, a fair coating will result in a short space of time. It is essential that the cloth be kept continually impregnated with fresh solution during the operation,

when, in a few minutes, sufficient metal should be deposited to stand burnishing or finishing, and if care is taken the faulty place should not be discernible.

Parcel Plating and Sand Blasting.—The plating of articles in two or three colours is done by stopping off the part of the article which does not require to be plated. For example, take a copper plate, some part to be left copper colour and the other silver; the part that requires to be left copper is varnished with stopping-off varnish, and when thoroughly dry the article is cleaned and put in the silver vat until the desired thickness of deposit is obtained. It is then swilled and dried out in sawdust in the usual way. When dry, it is placed in turpentine till the varnish is softened, and can be brushed off. It is then well cleaned and dried, when it is ready for burnishing or finishing, as desired. Articles of jewellery are done in a similar manner. For example, if gold flowers are required on a silver brooch, the part which does not require to appear gold is stopped off and treated as just described.

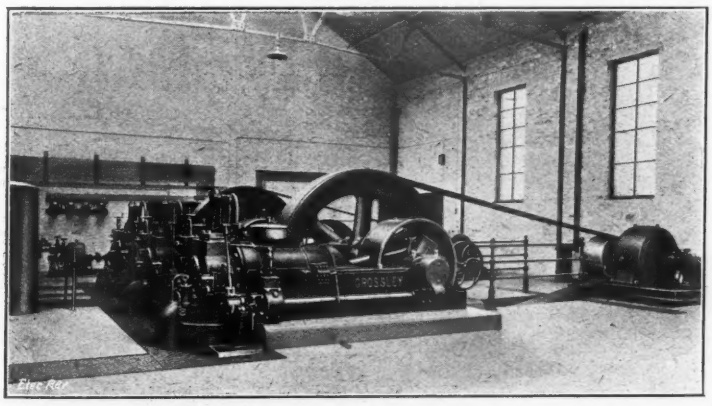
Articles that require a frosted appearance, such as cigar and cigarette cases, match-boxes, &c., are sand-blasted, and if material of suitable size is used, a fine or coarse matt appearance can be obtained.

ELECTRICITY SUPPLY AT HOLMFIRTH.

The official inauguration of the Holmfirth Urban District Council's electricity undertaking took place on Saturday, the 15th inst., when the generating station and equipment were inspected by the Electricity Committee.

The question of lighting the town and district by electricity was publicly considered in 1911, when the ratepayers adopted a resolution to apply for a provisional order, which decision was later confirmed by a plebiscite of the ratepayers.

The provisional order was obtained in August, 1912, and negotiations were opened with the Yorkshire Electric Power Co. with a view to obtaining a supply of electricity "in bulk"; local opposition to the scheme asserted itself, however, and as it seemed probable that the Yorkshire Electric Power Co. would not be in a position to give the proposed supply for some few years, the original scheme was dropped.

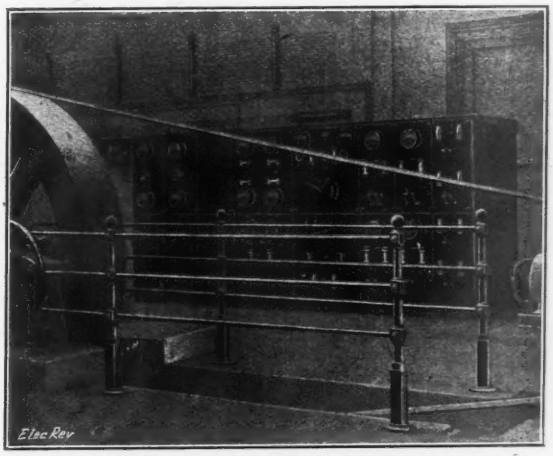


Gas-engine-driven Generators, Holmfirth Electricity Works.

The Council accordingly decided to establish an electricity works of its own in Holmfirth, and, an Electricity Committee having been appointed, tenders for the entire generating equipment and complete installation were called for, to the specification of Mr. A. B. Mountain, and the contract was ultimately awarded to Messrs. T. W. Broadbent, Ltd., of Huddersfield. The Council is to be congratulated on having allotted the work before the recent heavy increase in the costs of all engineering materials took effect, although, as a matter of fact, the formal contract was not prepared until March, 1915.

The electricity works are situated near the centre of the town, and provision has been made for probable extensions in the future; the plant consists of direct-current generators, driven by gas engines supplied with producer gas, working in conjunction with a small battery.

The gas-producing plant is placed in a shed which adjoins the generating station, and consists of two open-hearth suction producers, of Messrs. Crossley Bros.' latest design, having several novel features. One useful feature is the arrangement of pipe connections, by which either engine can be run from either plant merely by closing and opening isolation valves; the gas generator is a cylindrical vessel, lined with firebrick, the fuel being supported on a stepped grate, so that the fuel bed is in full view of the operator.



Main Switchboard, Holmfirth.

By an ingenious arrangement of water siphon, the amount of steam generated is automatically governed by the load on the engine. The water necessary to generate the steam passes through several gilled tubes in series, receiving an increment of heat from each tube, and finally overflows into a "flash" tube, where it is flashed into steam.

On its way to the scrubber for cooling and cleaning, the hot gas is made to pass through two cascades of water which form the overflow to the scrubber; by this means the heavier impurities are removed before the gas reaches the coke in the scrubber.

The gas engines are of the Crossley horizontal type, developing 190 B.H.P. (maximum) and 95 B.H.P. (maximum) respectively, and both running at 190 R.P.M. The larger one is a double-cylinder engine, while the smaller one has only one cylinder; the cylinders are all of the same size, which obviates the need for holding a large stock of spare parts.

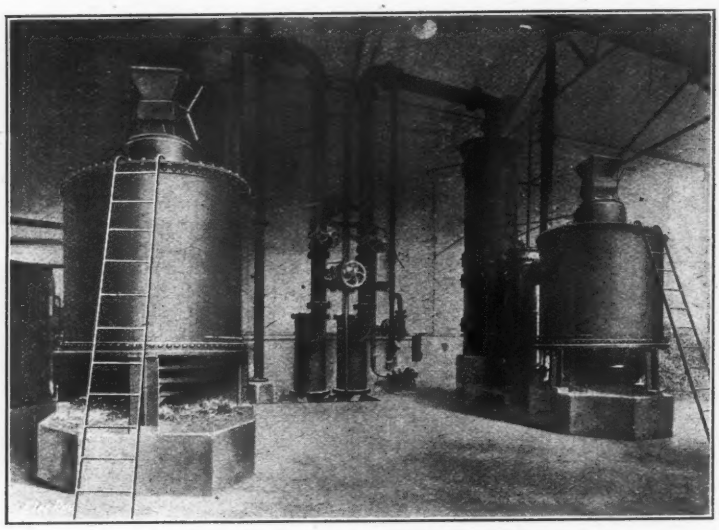
The engine governing is of the "variable admission" type, in which the main inlet valve itself becomes a throttle; impulses are not only given to the engine at each working stroke, but are certain, at any position of the governor.

The electric generators are of Messrs. Broadbent's well-known "D" type, and are belt-driven from the engine fly-wheels. The larger of the two generators has an output of 100 KW. when running at a speed of 625 R.P.M., and the output of the other is 60 KW. when running at a speed of 640 R.P.M. The generators have auxiliary poles, and are each fitted with three bearings of the automatic ring oiling type. We understand that the temperature rises of the windings, taken at the end of the full load test-run, were—in the case of each machine—well below the limits laid down by the "E.S.C."

The three-wire system of distribution is employed, with a declared pressure of 440 volts across the outers, and the neutral earthed. A rotary balancer by Messrs. Broad-

bent is employed to maintain electrical equilibrium between the two sides of the system, and there is a small Chloride battery to deal with the night load. This battery consists of 250 "HLG 3/5" type cells in glass boxes; sufficient margin has been allowed in the dimensions to meet the possible requirements of additional capacity at some future date. The battery is capable of discharging at the rate of 104 amperes for one hour, or 20 amperes for 10 hours; for charging it, a three-wire motor-driven booster, supplied by Messrs. Broadbent, is employed.

The switchboard consists of eight panels of enamelled slate; three generator panels (one of them being blank at present), one battery panel, one balancer panel, one booster



Gas Producer Plant Holmfirth Electricity Works.

panel, four feeder panels, and two street-lighting panels; this also was made throughout by Messrs. Broadbent.

The distribution has been carried out on the three-wire system, by means of overhead mains, on steel poles in the centre of the town and on wooden poles in the outskirts. It may be mentioned in this connection that the arrangement of poles, struts, stays, and brackets has been carried out in a specially-secure manner suited to the peculiarities of Holmfirth, where acute angles and steep hills present problems requiring more than an ordinary amount of thought and attention. The poles also serve as standards for the street-lighting fittings and lamps, the street lamps being controlled by automatic time-switches, which are affixed to the poles when required.

House services are tapped off the overhead wires, and the tappings are taken into the consumer's houses (usually into the upper storey) through porcelain leading-in tubes. The charges for current are 6d. per unit for lighting and 2d. per unit for motive power, heating or cooking; and they are not unreasonable, in view of the present high prices of fuel, &c.

Already there is a fair demand for current for lighting purposes, and if the demand grows as it is expected to, the undertaking should, under the capable management of Mr. A. C. Bott, the engineer to the Council, prove a practical success. The capital charges are not excessive, and it is likely that the ratepayers will in time be rewarded for their enterprise.

We are indebted to Messrs. T. W. Broadbent, Ltd., for the particulars and views here given.

Patents and Alien Enemies.—Licences have been granted by the Board of Trade to Messrs. Edgar Allen & Co., Ltd., and the Rapid Magnetting Machine Co., Ltd., in respect of Patents Nos. 14,082/08, granted to Ullrich, and 17,459/09, 29,201/11, 29,224/11, 29,230/11, 4,595/13, 14,426/13, 14,427/13, and 24,353/13, granted to Fried. Krupp A.G. Grusonwerk.

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Lamp-locking Batten Holder.

In response to the very considerable demands of the trade, Messrs. Lamlok, of 18, Ranelagh Gardens, Hammersmith, W., have now introduced a lamp-locking batten holder, which we illustrate in fig. 1. It will be seen that this fitting consists of a flange piece for fixing on to the batten, with a short-distance piece screwed on to it, while the lampholder is attached to the other end of th distance piece by means of a suitable screwed clamping ring.

The lamp lock is of the makers' well-known "pin" pattern, the pin screwing through the lower flange of the distance piece into the holder, and pressing on the lamp top, thus preventing the lamp from being lifted in the bayonet socket and removed. The pin is turned by means of a small key, shown in our view.

The batten holder is solidly made in brass and machined all over.

Fig. 1.—Lamp-locking Batten Holder.

Hand-operated Starting Compensators.

The British Thomson-Houston Co., Ltd., of Rugby, have issued a new list, No. 5,250, dealing with type N R hand-operated starting compensators, for two and three-phase squirrel cage induction motors. These are designed to reduce the excessive starting current of such motors without unduly reducing the torque, and consist essentially of an auto-transformer in which a

Fig. 2.—B.T.H. Wall-type Starting Compensator.

tapping is taken off the winding at a suitable point to secure the required reduction in voltage.

Such compensators are suitable for 25, 33⅓, 40, 50 or 60-cycle squirrel cage motors of up to 750 H.P. on pressures of from 95 to 3,300 volts and are built either in wall suspension or floor types, the latter being for large sizes.

The switch handle has three positions: "off," "starting" and "running." An automatic low-voltage release is fitted and, if desired, overload relays can be provided as also push-button stops. In order to meet different starting requirements, the starting voltage can be varied by means of the several taps provided on the compensator winding. The compensator and oil switch are enclosed in a C.I. case, with the switch, which is of the oil-immersed type, underneath in the wall pattern and on the top in the floor pattern.

The largest compensators, owing to the currents dealt with, have a separate sheet-iron control panel carrying the switches, ammeter, current and potential transformers, and are provided with steel framework and expanded metal screens.

SEARCHLIGHT CARBONS.

IN a lecture delivered at the U.S. Coast Artillery School, last year, Mr. R. B. Chillas dealt with the subject of searchlight carbons; the following is an abstract of his remarks, which were reprinted in the *Journal of the U.S. Artillery*:—

The principal considerations governing the choice of the proper carbons for searchlight requirement are that the positive crater of the arc shall be maintained at the focal point of the parabolic mirror, and that the lamp mechanism and the carbons shall be so co-ordinated as to bring about this condition with the minimum of attention on the part of the operator. The essential requirement for this is that the lamp mechanism shall advance the carbons at as nearly as possible the same rate as that at which they are consumed.

The types of lamp mechanisms available are those that have:—

1. A fixed feeding ratio.
2. A variable feed ratio, under control of the operator.
3. A semi-automatic feeding mechanism. (See Beck lamp).

The first type largely predominates, and since this presents the most severe carbon conditions, the discussion will be confined to this type only.

The basis upon which the present work was carried out is that the function of the positive carbon is to produce a light of the maximum efficiency, steadiness, and concentration, while the negative carbon, which is the more important from an electrical standpoint, must maintain a steady arc, cause the least possible sacrifice in the efficiency, and permit the required degree of control of the linear burning ratio of positive to negative.

The desired searchlight arc should excell in the following particulars:—

(1) Small positive crater, with high current densities, and thus high crater temperature throughout the crater area, which gives high intrinsic brilliancy; (2) small negative carbons; (3) long arc length; (4) uniform mixture of carbon, so as to help evenness of burning.

The present discussion mainly concerns the first three of these. The importance of the last is fully realised by the manufacturer, and need not be taken up at present.

In experimental tests on the present standard sizes it was found that when the arc is on the negative shell, instead of on the core, the arc stream issues from a very small bright spot, apparently as a high velocity blast, in a direction normal to the carbon surface. If this surface is directly facing the positive, the stream is straight, and usually steady; if not, the arc must bend toward the positive, and unsteadiness, hissing, and rapid wanderings of the arc occur, often resulting in an outrage (arc break).

For a 200-ampere, 70-volt arc, the diameter of the negative spot is estimated at ·07 in. to ·10 in. (1·8 to 2·5 mm.), corresponding to a current density of 25,000 to 50,000 amperes per sq. in. (3,900 to 7,800 amperes per sq. cm.). The diameter and the current density of the positive bright spot or arc crater are, respectively, ·8 in. (20 mm.), and 400 amperes per sq. in. (62 amperes per sq. cm.).

In operating large negatives, such as the G. E. 36-in. and the foreign 100-ampere 21 mm. or similar larger ones (current densities below 200 amperes per sq. in. or 30 amperes per sq. cm.), the prevailing shape of the tip of the negative is blunt and rounded, or even slightly cupped with cored negatives. With such a shape, periods of marked unsteadiness and troublesome burning are almost certain to occur. The appearance of the positive crater reminds one of an octopus, with many rapidly-moving tentacles. The efficiency at such times is very low, 30 per cent. of normal. The negative finally becomes sufficiently rounded, and the arc becomes steady for 20-30 minutes, to be followed by another spasm of 3—5 minutes of poor burning; this cycle repeats through the life of a trim. The operator can do very little to overcome such trouble; it appears to be due mainly to a faulty choice of sizes.

It was noticed that very good steady arcs occurred provided a favourably-shaped point was obtained, on which the tendency to wander was diminished; that the core in the negative is non-essential; that such a carbon would probably be of small diameter, and this, if true, would give an added advantage in that the shadow region, due to the negative, would be decreased. Some heavily copper-coated solid carbons, with diameters ½, ⅝, and ¾ in. (13, 16, and 19 mm.), were tried on the 60-in. lamp at 200 amperes. These indicated the value of the small negative.

With a properly-chosen grade of carbon, the negative bright spot scarcely wanders from the tip of the carbon; in fact, a small graphitised "wart" about 0·10 in. in diameter forms on the end of the carbon, and the arc peristently stays on this tip.

On the G. E. 60-in. lamp, using 2-in. diameter positive and 1⅜-in. negative, at 175 or 200 amperes, the arc on the positive wanders sufficiently to keep a fairly well-formed carbon crater, though the actual arc crater or hot spot does not nearly cover the end of the carbon. This necessarily leads to unsteadiness and poor efficiency in the searchlight beams.

With a negative as above described, the arc stream is directed steadily at a spot on the positive, where a bright, sharply-defined arc crater appears, and a very deep crater may form (if the positive is large), until finally the tip of the negative is within the crater, and the arc burns against the sides, tending to give a somewhat spherical hole within the positive.

A material improvement could be made by decreasing the size of the positive. An interesting series of observations was obtained on crater formations under different conditions, using high-grade positive carbons with a small 418-C core and ⅝-in. copper-coated coke solid negative, at a current of 200 amperes and 68—70 volts.

Carbon diameter, in.	*Crater characteristics.*	*Steadiness.*
1·0.	Rounded end of carbon, arc crater overlapped end, hissed badly.	Very poor.
1·125—1·25.	Nearly flat crater, sharp edges.	Fair.
1·375.	Good cup-shaped crater, sharp edges, arc crater nearly covered the carbon crater. Best general condition.	Excellent.
1·50—1·625.	Deeper crater, outer edges slightly rounded, good general condition.	Good.
1·75—2·00.	Crater very deep, with nearly parallel sides. May be wider at bottom than at mouth. Negative tip within crater, very noisy, outer edges more rounded.	Erratic, good, or very poor.

As the diameter increases, spindling and the rate of consumption decreases.

Another series of tests with 1⅜-in. positives and ⅝-in. copper covered negatives, and varying the current and voltage slightly, gave the following:—

Current.	*Arc voltage.*	*Crater formation.*
Normal — 200 amps.	Normal — 68 volts	Normal
Normal — 200 ,,	Lowered — 66 ,,	Tends to deepen
Normal — 200 ,,	Raised — 70 ,,	Tends to flatten
Raised — 210 ,,	Normal — 68 ,,	Tends to flatten
Lowered — 190 ,,	Normal — 68 ,,	Tends to deepen
Raised — 210 ,,	Raised — 70 ,,	Flat, unsteady
Lowered — 190 ,,	Lowered — 66 ,,	Rapidly deepens

While the crater formation is controlled principally by the carbon size, the influence of the texture of the carbon must be considered at the same time. The first question that enters with changes in texture is that of spindling. A carbon of sufficient size must be selected such that when it has spindled to its natural shape the end will be large enough for the crater.

The arc crater should almost wholly occupy or cover the end of the positive carbon, so as to form a symmetrical cup-shaped carbon crater. This gives a sharply defined beam of high efficiency, since there is no low temperature radiating surface facing the mirror at the focus. Furthermore, the crater being definitely located on the end of the carbon, it cannot wander laterally out of focus, and hence there results a steadier beam.

A further improvement has also been made by cutting down the size of the core hole in the positive. With the new steady negatives, the positive core areas have been reduced to 25-30 per cent. of the former sizes.

The negative carbon is the more important from electrical considerations. The maximum operating arc voltage with a given line voltage is measured by the permissible number of outrages, or arc breaks, within a given time.

In tests to determine the proper size, it was found possible to choose a plain negative, which will have the capacity to carry continuously such a current as will give a positive crater covering the tip. A carbon of this size, however, will tend to burn blunt, and hence is unsteady. This statement applies more particularly in the case of currents above 75 amperes for reasons which will be discussed below. Smaller carbons tend to spindle excessively, but the steadiness usually improves as the tip becomes pointed. For 100-110 amperes a 1-in. diameter carbon is about at full load, and spindles approximately 3 in. Increased current carrying capacity is therefore required, and may be secured as follows:—

1. By increased diameter. This is in the direction away from steadiness, as shown above.

2. By changes in mix. This is also expensive and of very limited range, as shown by years of almost vain efforts to get satisfactory results with the present sizes.

3. By copper coating. This is by far the simplest and offers a much wider range of control and better burning conditions than any of the above.

With positives chosen as above described, it has been found that by successively decreasing the size of the negative and at the same time increasing the amount of copper coat, the necessary current carrying capacity can be maintained and a tip shape increasingly favourable to steadiness is obtained.

It has been found that beyond a certain point further increases in the amount of copper give a relatively small decrease in resistance.

D

The best negative is such a one as will require somewhat less than ·003 in. copper to give satisfactory continuous operation.

Quite an appreciable change may be made in the rate of consumption, either by changing the amount of copper or by slight changes in diameter from that which gives the test steadiness.

It was found that with positives and negatives selected as above described, the natural burning ratio, while increasing as the size of carbons increases, is or can be made to be essentially 1 to 1 for a large number of the usual sizes, with but little or no sacrifice in efficiency. This feeding ratio appears to be quite generally standard among the principal lamp makers, except that one large American manufacturer, who has supplied a number of lamps to both the Army and Navy, has used a 1·65 to 1 ratio for a number of years.

Average figures from tests in the present G.E. mechanism show the following burning-hour results :—

Size in inches		
60-in. $1\frac{3}{8}$ × 15 Pos.	$\frac{5}{8}$ × 12 Neg.	3·00-3·75 Hrs.
36-in. $1\frac{3}{8}$ × 10 ,,	$\frac{1}{2}$ × 9 ,,	2·75-3·50 ,,
24-in. $\frac{3}{4}$ × 10 ,,	$\frac{3}{8}$ × 9 ,,	3·00-3·50 ,,
Small lamps, 18-, 13-, and 9-in.		3·00-3·50 ,,

The advantages in operation greatly outweigh the somewhat short life.

An important feature is that a larger volume of positive carbon is consumed for a given volume of negative carbon in the larger sizes than in the smaller ones.

It has been found that the cross section of a copper coated negative which will burn with a well pointed tip and which lies in the region of the best control of the copper coat, is proportional to the current plus a constant.

With positives selected to have a crater covering the tip, it is found that the current density increases as size increases. Since the radiating surface per unit volume decreases, and the wattage per unit volume when the carbon has burned to shape rapidly increases with increase in diameter, the operating temperature of the tip tends to rise, and therefore the rate of consumption of the positive increases at a rate more than proportional to the current.

If it is desired to maintain a given lamp feeding ratio, the diameter of the positive must increase faster than the current, in order to keep the crater at the focus.

The 1-1 lamp feeding ratio chosen most nearly fulfils the requirements of good burning, for normal grades of carbon in the range of currents between 50 and 125 amperes. The sizes of positive to give 1-1 burning ratio at 150 and 200 amperes are too large for the best burning conditions, but since the 150-ampere size is not much used in American practice, though quite common abroad, the 1-1 ratio has been adhered to for this trim.

For the 200-ampere size, 68-70-arc volts, the best positive is about 35 mm. ($1\frac{3}{8}$ in.), and with a 16-mm. ($\frac{5}{8}$-in.) negative, the burning ratio is about 1·35 to 1. For 1-1 burning the positive must be 40-41 mm. ($1\frac{5}{8}$ in.) in diameter. The smaller size is preferred.

For currents less than 50 amperes and a 1-1 ratio lamp, the positive must be smaller than that required by the crater conditions. Decreasing the negative leads to short life, since the available burning length is ordinarily rather small. Hence a slightly faster burning positive has been chosen for these smaller sizes.

In connection with the above discussion, it has been found that a 10 per cent. variation either side of the rated current may be made without appreciably affecting the burning ratio.

The preceeding discussion has been based on steady operation.

If the operation of the lamp is intermittent, the net result is that the rate of consumption of the negative is decreased, giving an increase ratio and a tendency towards a positive crater movement.

It should be noted here that the effect of intermittent operation is different with different classes of carbons.

A few notes concerning the use of the flame arc for searchlight purposes may be of interest.

It has been found that the positive arc crater on an impregnated flame carbon is of decidedly smaller area than the crater on a pure carbon. The carbons for this work are of special design, using a pure carbon shell with an impregnated flame carbon core. Only a very short length of carbon actually carries the current, and this is wholly within the cooling chamber of the carbon holder.

It should be borne in mind that the current carrying capacity of a (metallic) conductor is limited mainly by the operating temperature, so that the current can be raised, provided that adequate cooling methods are used.

The negative carbon is also of small diameter, and is properly cooled. For example, the carbons now under test in a 150-ampere lamp are a 16-mm. ($\frac{5}{8}$-in.) flame-cored positive, and a 11-mm. ($\frac{7}{16}$-in) cored negative. The actual positive crater is about 14 mm. in diameter, In operation, the negative carbon is inclined at an angle of about 20° below the axis, and in such a position that the central tongue in the negative arc flame strikes about on the upper edge of the positive crater. The positive carbon is continuously rotated and fed forward, and forms a symmetrical crater about 10 mm. deep, filled with the highly luminescent gas of the flame arc. This gives an extremely concentrated light source of high candle-power, which is practically ideal for searchlight requirements.

A comparison of the Beck and the Sperry lamps shows the following essential differences: The Beck lamp makes use of a spray of alcohol, or other similar hydrocarbon, against the hot tips of the carbons. The alcohol ignites, but the temperature of its flame is said to be sufficiently below the operating temperature of the tips to act virtually as a cooling agent. In addition, the products of combustion act as a protective sheath, to prevent undue oxidation. Since alcohol is not permitted aboard warships, it will probably be necessary to use some other material. In the Sperry lamp cooling is accomplished, and spindling prevented by means of an air-cooled copper radiator, which surrounds the positive nearly up to the tip. Immediately in front of this radiator is a short-fused silica tube, out of which about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. of carbon is allowed to project. Air is supplied by a small motor-driven blower to this radiator, and also to the negative holder.

Two methods have been used for candle-power measurements, the first being the "point by point" method, which is both tedious and unsatisfactory; the second is a method developed in this laboratory using the integrating sphere, which, it is believed, will prove generally useful for this type of work.

LEGAL.

Lady Chemists and an Electrolytic Process.

An electrolytic process for the production of caustic potash was the subject of an application by two ladies in the Patents Court on Thursday last week.

Miss E. J. Smith, principal of the Chemical Works, Disraeli Road, Willesden, applied for a Board of Trade licence to use Patent 11,639, of 1910, in the name of Dr. Jean Billiter, of Vienna. Miss Smith was accompanied by her chief chemist, Miss Markham.

The Chemical Works, Willesden, is said to be the only chemical factory in England run by ladies. Miss Smith has considerable electrical experience. She passed at Edinburgh University through Prof. Bailey's class in Electrical Engineering, and, indeed, all the engineering classes at that University for the B.Sc. (Engineering), besides gaining distinctions in the Senior Engineering Class. Miss Markham is a Distinguished Honours student from the Chemical Department of Oxford University.

The process is for electrolysing liquids with kathodes arranged in strips, which are provided with covers for carrying away gas and permeable to current, the cover enclosing the kathode on all sides like a sack. Modifications provide for membranes completely surrounding the kathodes in the form of tubes, so that the kathode product escapes only by diffusion or electro-diffusion; tubes of asbestos fibre; and a membrane, permeable to current, stretched over the electrodes by weighting with heavy bodies, or rendering the kathodes resilient by springs, or other means, to prevent the formation of detrimental alterations of shape, or detrimental gas spaces. It is claimed that with the new diaphragm processes for the electrolysis of alkali chlorides it is now possible to obtain concentrated alkali solutions with a very good electrolytic efficiency at a comparatively low pressure. That progress was led up to by either a rational stratification and circulation, or a quick removal of the kathode product out of each of the current lines. This type of process, however, has the disadvantage that the anode chamber is completely closed by a diaphragm, through which the feed solution passes into the kathode chamber. For undisturbed working the speed of flow has to be regulated, as the permeability of the diaphragm gradually becomes lessened, and the diaphragms require cleaning or renewal, necessitating the opening of the baths. On the other hand, in the Aussig bell process of electrolysis without diaphragms, the working can go on for years without interruption, but the current density is low, so that the apparatus is rendered larger, and as only small units can be produced it is difficult to watch them. The distribution of the feed solution in numerous small cells is complicated, and both the concentrations of lye and the electrolytic efficiency are lower.

The patent aims to combine the advantages of both processes and to eliminate their disadvantages. The anode chamber is not separated from the kathode chamber by any cohesive diaphragm, the cleansing and renewal are avoided, and yet the work can be carried on with high current densities and good electrolytic efficiency.

Miss Smith conducted her own case without counsel, and treated the Court to technical descriptions; Mr. W. J. Tennant, chartered patent agent, appeared for the patentee, explaining that the patent was applied for through his office, and he was present by the kindness of the Controller of Patents, Mr. Temple Franks (who heard the application), but he was entirely without instructions in the matter.

Miss Smith said she desired to produce caustic potash electrolytically, as a stage in the manufacture of potassium permanganate. She expected to manufacture without difficulty, though her work up to the present in this direction had been principally experimental. She did not propose to put caustic potash on the market. She wished to use the Billiter cell to manufacture at her factory potassium permanganate, and the cells would work for common salt electrolysis or, without any change, for the electrolysis of potassium chloride. There was a large sale for potassium permanganate, and the Government, when they required it, issued orders for 20 tons at a time. It was used in the trenches and all the military hospitals as a disinfectant, and was, she believed, used to refine oil for aeroplanes. She purposed starting with a manufacture of half a ton per week, and would install a 2-kw. dynamo and a 4½-h.p. gas engine.

The Controller: And the basis of royalty? Have you considered that?

Miss Smith thought the patentee had not afforded her any too precise details in his specification, and she did not think that anything but a small royalty should be paid. There would be a considerable amount of experimenting to be done. The dynamo,

gas engine, and accessories would probably cost £130. The price of potassium permanganate was fluctuating. At the moment on the market it was 8s. a lb., but it might come down to 6½d., as it was before the war. She did not propose to use the dynamo for anything else. She offered a royalty of 1 per cent.

Sir Cornelius Dalton pointed out that the figure could be revised after the war, and in the meantime the royalty would go to the Public Trustee. The Controller then announced that he would report favourably to the Board of Trade on the application.

Monometer Manufacturing Co., Ltd., v. Electric and Ordnance Accessories Co., Ltd.

With reference to this case, in which judgment was given, as already reported, for the plaintiffs on the claim, defendants' counter-claim being dismissed, we understand that a misprint occurred in our issue of June 30th, page 731, fourth line from the bottom, where, instead of 600 lb., 1,000 lb. should have appeared. In our report of the case we omitted to state that the plaintiffs, in presenting their case at Birmingham, said that the furnaces supplied were precisely the same as those supplied by them to the Government.

Munition Court Cases.

David Edward Jones, fitter, summoned the Newport Corporation electricity department, at the Munition Tribunal, for unreasonably refusing a leaving certificate. Mr. Nichols Moore, the borough electrical engineer, attended. Complainant stated that he was employed in the power station, and he gave a week's notice. He was influenced by the increased cost of living; his health was sometimes impaired, and his wife was an invalid. He could get higher wages in the repairing shops. The Clerk: Is the place controlled? Complainant: I believe so. Mr. Nichols Moore: It is a certified undertaking. The Tribunal thought that it would be better for the complainant to remain at a permanent place, considering that he was 60 years of age, than to go to a casual job. The Corporation, too, were supplying electricity to other important industries, and that was a factor that had to be kept in view at this time. They declined to grant an order for a leaving certificate.—*South Wales Argus.*

WAR ITEMS.

Exports to China.—In the "London Gazette" for July 25th a further list appears of persons and bodies in China to whom exports may be consigned.

Enemy Companies.—Mr. George Terrell asked the President of the Board of Trade the other day when the promised report as to the progress of the Committee on Enemy Companies and Shareholders would be ready. In reply, Mr. Harcourt stated that a summary of cases dealt with by the Advisory Committee up to June 2nd had been prepared and would shortly be circulated.

German Firms to be Suppressed in Russia.—The following concerns are listed in a proposal of the Minister of Trade and Industry to alienate right of exploitation from a considerable number of enemy firms still operating in Russia:—The Gas & Electricity Co.; the Electricity (formerly Lahmeyer, Frankfort-on-Main) Co.; the Electricity Contracts Co.; the Westphalian Wire Co., of Hamma.

Edmundson's Roll of Service.—We have received from Edmundson's Electricity Corporation, Ltd., a fine "Roll of Service," giving the names, and their positions with the Corporation, of 363 of their employés who have joined the Colours. Fifty per cent. of the men have already seen service in some form or other. We regret to note that 11 of the staff have lost their lives. Mr. J. Summers, of the Hamilton branch, has been awarded the Military Medal, and Mr. J. C. Knight, of Frome, the D.S.M.

To be Wound up.—The Board of Trade has ordered the following to be wound up, under the Trading with the Enemy Amendment Act:—

Balcke & Co., Ltd., London, S. W., water cooling engineers. Controller: J. W. Barratt, 19a, Coleman Street, London, E.C.

F. M. Frye & Co., 46, Upper Thames Street, London, E.C., hardware merchants and tool makers and merchants. Controller: C. W. M. Kemp, 36, Wallbrook, E.C.

M. C. Wedekind & Co., Ltd., 6, Lloyd's Avenue, London, E.C., dealers in old iron and steel. Controller: F. H. Finlaison, 45, London Wall, E.C.

London Electrical Engineers at Plymouth.—On July 14th the Company of London Electrical Engineers which is stationed at Plymouth spent a pleasant evening in celebrating the completion of "a certain course of military enterprise." Major W. H. Merrett, T.D., who presided over the function as O.C. of the Company, spoke enthusiastically of the manner in which the special work undertaken by the Company during the recent period had been carried out. He was proud to be in charge of such well qualified men. Major K. W. Edgcumbe then spoke in high praise of the attainments of the London unit, duties of an onerous nature which he had entrusted to them having been attended to with both zeal and skill.—*Western Daily Mercury.*

War Wages at Johannesburg.—The Town Council has granted an increase of 4d. per hour (from 2s. 6d. to 2s. 10d.) to all skilled mechanics and electricians in its employ, as well as a war bonus of 25s. per month to all employés drawing £240 per annum or less, except unskilled persons.

Exemption Applications.—Last week the Jarrow Tribunal heard an application by the Palmer Shipbuilding & Iron Co., Ltd., in respect of 15 unbadged workmen. One was an electrician, and the Clerk remarked that the electricians who came before the Tribunal were all from the South. "That means," observed the Mayor, "that ours have gone somewhere else." "To France," added the Clerk, whereupon the Mayor went on: "They go wherever their services are required."

At Bermondsey Tribunal, Frank Morton, of Isaria, Ltd., electrical engineers, of Tower Bridge Road, S.E., applied for a short temporary exemption in order to complete his arrangements to obain a commission. He informed the Tribunal that a month would be sufficient time, and this extension was granted him.

During the hearing of appeals at Denton for three employés of the Oldham, Ashton & Hyde Electric Tramway Co., it was stated that 46 per cent. of the employés of the company had joined the Forces, and, although they had a considerably depleted staff, nearly 200,000 more passengers had been carried during the past half-year compared with last year. Two men were granted conditional exemption, and the appeal for the third man, who was single, was disallowed.

A personal appeal was presented at Accrington last Thursday by a Corporation car driver with four children, who was not appealed for by the tramways manager, because he had not attested. It was stated that the man would be 41 in November, and so many men had gone away that the tramways manager would be glad to retain him. He was granted conditional exemption.

At Failsworth, four instrument makers and one meter assembler, employed by Messrs. Ferranti, Ltd., of Hollinwood, were granted temporary exemption until September 1st. Lieutenant Pool (Military representative) in one case remarked that many of the firm's men had been unbadged, and he could not say whether the man now appealing was one of them or not. He thought the firm ought to appeal for the men on business grounds.

At Oldham, the Corporation tramways manager (Mr. Priestley) appealed for a turner, who was granted conditional exemption as being in a reserved occupation, and for an apprentice fitter, who was granted temporary exemption until November.

The Chadderton Tribunal last week heard an appeal by a man (aged 38, married), employed in the insulating and connecting of coils at the works of Messrs. Ferranti, Ltd., Hollinwood. He was granted conditional exemption, being in a reserved trade, and advised to join the Volunteer Training Regiment.

At Rochdale, an appeal by Messrs. Jacksons, of the Hippodrom, for Harry Butterworth (32), electrician, was disallowed.

At Stretford, a cable company appealed for two members of the staff. One was granted conditional exemption, and the appeal for the other was disallowed.

A conscientious objection was lodged at Stretford by a switchboard attendant, aged 28, and married. He said he could not take the military oath either for combatant or non-combatant service. He had been a switchboard attendant for 18 months, and he repudiated a suggestion that he had entered this employment to try to escape military service. The appeal was disallowed.

Cookham (Berks) Tribunal has given exemption until September 1st to C. F. Bingley, electrician.

Bexley Tribunal has conditionally exempted John Hudson, electrician to Mr. W. A. Smith.

At Walthamstow, the Fuller Electric & Manufacturing Co. appealed for 20 employés. Mr. Fuller stated that of the 40 employés, 16 had enlisted and 11 had attested. Seven were given six months each, four three months each, and the other appeals were refused.

On the appeal of the U.D.C., Aylesbury Tribunal has given three months' exemption to the driver of a Diesel engine at the electricity works, the man being a time-expired soldier, aged 36, and single. Three months each were also conceded to an electrician and a confidential clerk employed by a local firm of electrical engineers.

At Bourne (Lincs.), Messrs. Pidcock & Co. appealed for their electrician, Chas. Lilley, and a final month was given, he having already been temporarily exempted until July 1st.

Grantham Tribunal has given exemption until November 1st to Fredk. Ingall (37), electrician at the Empire Theatre.

Hastings Tribunal has given exemption, on condition that he undertakes some public work, to Mr. F. Wordley (36), electric wiring contractor and engineer, of St. Leonards, who has charge of the X-ray apparatus at the East Sussex Hospital. The same Tribunal has conditionally exempted for three months Mr. R. Chapman (29), electrician with Messrs. Bruce & Co.

East Ham Tribunal has granted three months' exemption to J. W. Collis, electrician.

At Tunbridge Wells, A. E. Heskett, electrical wireman, appealed on business grounds, and also as a conscientious objector. The appeal was rejected.

Eastbourne Tribunal has granted a final six weeks' exemption to an electrician at the Pier, who has charge of the installation.

At Romsey, Major Fraser appealed for the superintendent of his electric plant, and stated that the man would be 41 in a day or two. Exemption was given until the end of September.

Mr. J. Connare (37), electrician, in business in Watford, has been granted conditional exemption by the local Tribunal.

The West Kent Appeal Court has given exemption until September 1st to Mr. A. Lynch (30), electrician, of Trosley, near Maidstone.

The East Kent Appeal Court has given exemption until October 11th to Mr. A. E. Coupley (37), electrical attendant on the estate of Major Galway, at Sellindge. The local Tribunal had refused any exemption.

The Blandford Tribunal, on July 20th, considered an appeal by Mr. C. H. Wellman, electrical engineer, of Milton Abbas, and he was given until September 30th. Appellant retorted that he would go at once.

At Stratford-on-Avon, on July 18th, the Electricity Co. appealed for their manager, Mr. J. E. Rendell-Baker (35). The company, it was stated, supplied three hospitals, and power for munition works, besides public and private supplies. The pre-war staff of 11 had been reduced to five. Mr. Rendell-Baker was given conditional exemption.—The same decision was arrived at in an appeal for a fitter at the generating station; and five weeks, with no further appeal without leave, were allowed Mr. A. R. Bailey (24), the company's secretary.

Mr. A. O. Game, engaged with a Catford firm of electrical engineers, the only one left capable of undertaking certain work, has been exempted until November 1st, on condition that he joins the Volunteer Training Corps.

At Carlisle, on July 19th, the Tramway Co. appealed for six married employés, and it was stated that the staff had been so depleted that Mr. McCulloch had had to go driving himself. When the war broke out there were 37 employés; 26 had joined the Army, and they now had only six men of military age, none being under 32, and all being absolutely necessary for the service. In each case conditional exemption was allowed.

At Witney, the U.D.C. applied for extended exemption for Victor Brice (19), station electrician. The manager of the electricity works (Mr. Curel) said that since the last exemption he had advertised for a successor, and had had three or four replies, but none of the applicants were satisfactory. Giving two months, with leave to apply again, the Chairman expressed the hope that another appeal would not be necessary. Mr. Curel replied that he would make every effort to get a substitute.

Ilford Tribunal has given three months' final exemption to Wm. John Hayden (18), an apprentice electrician, enabling him to complete his indentures.

At Bexhill-on-Sea, Messrs. Squirrell & Co., Ltd., of Station Road, appealed for their electrician, J. F. Gibbs (38), who was needed to assist with contract work. Three months were allowed.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

The Neglect of Science.

At the last meeting of the Committee on the Neglect of Science, it was decided to collect well-authenticated cases in which the neglect of science by officials, firms or individuals had caused loss or damage to the nation, firms or persons. If you and your readers can assist in this matter it will be much appreciated. Precise information is required, as it is desired to quote "chapter and verse" in each case.

This, naturally, makes it difficult to obtain the required information, but it will readily be seen that without such full particulars the examples would be of little value.

Alfred S. E. Ackermann,
Hon. Treasurer.

Westminster, *July 20th*, 1916.

P.S.—The Simpson Lever Chain is a case in point!

[We should think that numerous instances will be forthcoming. The collection of such data should be of the greatest value in view of the campaign in favour of reform in the teaching of science which is now in progress.—EDS. ELEC. REV.]

Electric Fans for Military Hospitals.

I was interested to see a letter on this subject in your issue of the 14th from Mr. Falshaw, an old acquaintance.

I have just returned to this country from India, where I have been engaged in electrical contracting work for the past 15 years, in which time I have had some thousands of ceiling fans through my hands. When I came away, at the end of 1915, the Indian Government was busy buying fans for the Persian Gulf Forces, of the standard patterns used in India.

Probably 80 per cent. of the Indian fans are direct-current 225 volts, as this voltage is almost standard for the country, and is in use in Calcutta, Bombay, Barrackpur, Darjiling, Madras, Dacca, Lahore, &c., and a settled thing for many schemes now in course of execution.

Mr. Falshaw did quite the best thing he could have done in advising his friend to have the fans sent from Bombay, and I hope he has got delivery all right.

Edw. Vickers.

Warwick, *July 18th*, 1916.

Declaration of Origin of British Goods.

The writer would be pleased if you would inform the electrical trade, through the medium of your paper, of the neglect of British manufacturers and merchants in omitting to attach to invoices declaration of origin. The Customs of South Africa demand a properly worded declaration on British goods, and not merely the words at the foot of invoice "British manufacture." Foreign goods to have the usual pink form of declaration, signed by the Consul and stamp cancelled. Goods of enemy origin that have been in stock prior to the war to have pink forms, signed by a Justice of the Peace.

Of late, several merchants are receiving documents without the necessary declaration; the result is the Customs refuse to release, and demand a deposit of three times the value of the shipment, pending receipt of the necessary document. Furthermore, a fine of £500 can be levied by the authorities should they look upon the shipment suspiciously.

British Agencies, Ltd. (H. BARDEY.)

Johannesburg, *June 26th*, 1916.

[We trust our readers will appreciate the great importance of this communication. Not only in the future, but already in the present, the clearest and most indubitable proofs of the British origin of genuine British manufactures must be furnished upon entry into our oversea Dominions and Colonies, and should be furnished also with exports to allied and neutral countries. British goods should be sharply distinguished from goods of enemy origin.—EDS. ELEC. REV.]

BUSINESS NOTES.

Thermit, Ltd.—MESSRS. THERMIT, LTD., have received official notification from the Public Trustee to the effect that he has entered into an agreement to sell the whole of the enemy shareholding in that company to the Birmingham Metal and Munition Co., Ltd., Birmingham. Messrs. Thermit, Ltd., will continue to trade in exactly the same way as hitherto.

Board of Trade Inquiries.—The Board of Trade Commercial Intelligence Branch has received inquiries from firms at home for the names of British makers of the following :—

Batteries for pocket flash lamps.
Cases for pocket flash lamps.
Electrolytic iron.
Fibre, vulcanised red.
Arc-lamp globes (inner and outer).
Lamps, pocket flash.
Magnets, tungsten steel, permanent.
Electric steel castings.

H.M. Minister at Bogota states that the provincial towns in the Republic of Colombia are gradually being supplied with electric lighting installations, for which cheap fittings are required.

H.M. Consul at Lyons reports that a local firm desires to purchase from, or to represent on a commission basis, British manufacturers of supplies and apparatus for the electrical and engineering industries. Applications to the Board of Trade Commercial Intelligence Branch (Reference No. 228).

Bankruptcy Proceedings.—F. BROWN, electrician (formerly partner in the firm of Hugh Bros. & Brown), 8, Stafford Street, Llanelly.—First meeting, August 1st, at Official Receiver's Office, Carmarthen; public examination, August 1st, at the Guildhall, Carmarthen.

C. P. PEARSON (Pearson & Co. and the B.O.A. Engineering Co.), electrical, mechanical and sanitary engineer, decorator and plumber, Manchester.—Trustee (Mr. A. Yearsley) released June 16th, 1916.

G. E. BONNER, electrical agent, Palmer's Green.—First and final dividend, 2s. 2¾d. in the £, payable July 27th, at 14, Bedford Row, W.C.

For Sale.—The borough of Salford electricity department has for disposal two Browett-Lindley six-cylinder compound engines, direct-coupled to Mather & Platt D.C. generators, and one Bailey-Davidson and one Hall vertical steam pump. For further particulars see our advertisement pages to-day.

Trade Announcement.—MR. CHAS. WM. OWENS has taken over the business of Messrs. W. T. Owens & Sons, electrical engineers, of Pontardawe, Mr. Fredk. Wm. Owens having retired.

Dissolutions and Liquidations.—FUEL GAS, LTD.—A meeting is called for August 25th, at 6, East Parade, Sheffield, to hear an account of the winding-up from the liquidator, Mr. B. C. Davies.

THE CONSTANT VACUUM CARBURETTER SYNDICATE, LTD.—This company is winding up voluntarily, with Mr. A. W. Hoale, of 90 and 91, Queen Street, E.C., as liquidator.

THE SHERARDISING SYNDICATE, LTD.—This company is winding up voluntarily, with Mr. R. J. R. Warner, of 34, Ebury Street, S.W., and Mr. C. J. Jones, of 24, Wood Vale, Forest Hill, S.E., as liquidators. A meeting of creditors is called for July 26th, at 70, Chancery Lane, W.C.

EXCELSIOR (ALUMINIUM) SOLDER CO., LTD.—A meeting will be held at 14, St. Ann's Square, Manchester, on September 1st, to hear an account of the winding-up from the liquidator, Mr. J. R. Atkins.

E. M. BRINCKMAN & CO. and the FLEISCHAACHER BRITISH LAMP CO., London.—Creditors of these businesses, carried on by Max Brinckmann, at 99, Redcross Street, London, S.E., an enemy subject, must send particulars of their claims, &c., to the Controller, Mr. K. C. Fox, 45, London Wall, E.C., by August 24th.

DONNISON, SILLEM & CO., electrical engineers and contractors, 116, Great Portland Street, W.—Messrs. F. A. Donnison and W. Sillem have dissolved partnership by mutual consent.

An Inquiry from India.—MR. SUNDERRAO MORESHWAR, electrical engineer, Girgaum, Bombay, asks for names of firms dealing in machinery for repairing electric fans of all makes, armature winding, &c.; also for catalogues containing description of, and working instructions for, such machinery.

Royal Assent.—The following Acts have received the Royal Assent:—

Electric Lighting Order Confirmation Act.
Metropolitan Electric Tramways Act.

Catalogues and Lists.—MESSRS. ALFRED HERBERT, LTD., Coventry.—Postal card describing a convenient rubbish destructor for engineering works.

MESSRS. J. H. HEATHMAN & CO., Parson's Green, Fulham, S.W.—Leaflet describing the "Salisbury" truck and "Cleveland" trolley.

MESSRS. QUEAD, LTD., 47-57, Marylebone Lane, Oxford Street, W.—Catalogue of "Quead" electric fires for 1916-17, showing a number of new patterns, with two-colour printing, giving a red-hot appearance to the elements.

THE WESTINGHOUSE COOPER HEWITT CO., LTD., 80, York Road, King's Cross, N.—Pamphlet describing blue-printing apparatus with Cooper Hewitt lamps; a new machine washes, dries, and irons all classes of photo prints "while you wait."

THE IGRANIC ELECTRIC CO., LTD., 147, Queen Victoria Street, E.C.—Leaflet No. 1,621, describing magnetic couplings, clutches, and brakes, for torques from ¾ to 51,400 lb. ft.

SUN ELECTRICAL CO., LTD., 118/120, Charing Cross Road, London, W.C.—Two new lists: No. 275 gives illustrated particulars and prices of portable electric tools (grinders, drills and buffers); and No. 276 deals similarly with electric fans (table or desk, oscillating, ventilating ring and ceiling types, ventilating fan motors for large volumes and powers, &c.). Large numbers of the tools and fans included in these lists have been supplied to Government works in connection with the war.

MESSRS. HIGGS BROS., Sherbourne Road, Balsall Heath, Birmingham.—Eight pages for addition to their catalogue. They give tabulated speeds, prices, code-words, running instructions and dimensions, for their shunt-wound ventilated motors, also an efficiency curve.

Book Notices.—The third number of the "*Journal* of the British Science Guild" has now appeared. Copies, price 6d. each, may be obtained on application to the Secretary, British Science Guild, 199, Piccadilly, London, W.

The Russian Press.—From Messrs. Neyroud & Sons, Ltd., of Regent House, Kingsway, we have received a booklet giving a list of the more important Russian newspapers, periodicals and trade journals, the populations and industries of the towns in which they appear, and a word or two regarding the class of publication.

LIGHTING AND POWER NOTES.

Aylesbury.—The U.D.C. has decided to offer a supply of current to the Dominion Dairy Co., Ltd., at 1½d. per unit when oil is £8 per ton, and for every increase or reduction of 5s. per ton on that price an increase or reduction of ·02d. per unit, the charge to be reconsidered if the price of oil goes beyond £10, or falls below £6 per ton. A previous quotation by the Council was declined by the company.

Bath.—DIESEL ENGINE REPORT.—The city electrical engineer, reporting on the cost of putting the Diesel engine into satisfactory working condition, points out that this was originally estimated at £150, but had actually amounted to £451. This was due largely to the conditions brought about by the war, but also to other repairs found necessary while the work was in progress. The first contract price for the plant based on 450 KW. was £5,451; the second, based on 340 KW., was £4,240; the amount paid to the makers at settlement was £1,575, so that the actual cost of the plant (taken as 300 KW.) amounted to £2,026. Recent tests have shown a fuel cost of ·29d. per unit generated, with fuel at 75s. per ton, which compares with average coal costs for the steam plant of ·55d. It is expected that lubricating oil costs will be reduced to ·06d. per unit generated. Owing to the cost of oil fuel being about £9 per ton now, it is only intended to run the set occasionally on the existing fuel stock. The repairs included re-levelling and bedding the crankshaft, and alterations to the compressor, air bottles, fittings, valves and governor gear, and were carried out by Messrs. Belliss & Morcom on a time and material basis.

Bexhill.—PRICE INCREASE.—The Electric Light Committee recommends a further advance in the price of electricity of 5 per cent., making a total advance of 15 per cent. since the commencement of the war. The Committee states that a preliminary report for the year ended March last shows a very substantial loss, although the 10 per cent. price increase was partially in operation. The cause is the continued advance in the price of coal, and is in no way associated with the reduction of hours of lighting consequent on the Summer Time Act.

Bishop's Castle.—WORKHOUSE LIGHTING.—The Board of Guardians has agreed to a recommendation to adopt a scheme for the installation of electric light at its institution, at a cost of £20 10s. for 41 lights and £1 5s. for dimmer lights in the sick wards, the supply to be by meter at the rate of 6d. per unit.

Blackpool.—The output of the electricity works during June was 381,205 units, an increase of 34,508. Private lighting showed the enormous decrease of 10,674 units and public lighting of 4,000 units, while the tramways used 44,830 units more. An average daily increase of about £90 in receipts on the tramways was also shown for the 24 days from June 19th.

Bradford.—LOANS.—The Corporation has received a communication from the L.G.B., stating that the latter is not prepared to sanction at present a loan of £100,000 for the extension of plant at the electricity works, in view of the fact that such extension would not be required for national purposes. The Board is willing that extensions of mains shall proceed as at present, without the necessity of submitting a special resolution in each case. The Electricity Committee has decided to invite the three sitting members of Parliament and member of the Shipley division to meet a Committee to consider the position, with a view to an interview being sought with the Minister of Munitions on the question.

Cardiff.—RESTRICTED LIGHTING.—At the last meeting of the Electric Lighting Committee, Mr. A. Ellis, the city electrical engineer and manager, reported that the restricted lighting order would have a serious effect on income, reducing the revenue by about £20,000 to £25,000. Street lighting had been discontinued; in the year ended March, 1916, the income from such lighting was £9,798; it was now estimated at £881, including all charges, and the loan charges of £902 therefore exceeded the estimated income. —*Western Mail.*

Croydon.—YEAR'S WORKING.—The report of Mr. Alex. C. Cramb (borough electrical engineer), on the year's working of the electricity undertaking to March last, showed that the output for public lighting had decreased by 50 per cent. as compared with pre-war times. The decrease on private lighting over the previous year was 189,865 units, or 405,861 as compared with pre-war conditions. The coal bill showed an increase of £9,457, and it was anticipated that the present year would see a further increase of £7,000. On the revenue account a gross surplus of £24,817 was shown after allowing for working expenses, or 6½ per cent. on the capital expenditure. Sinking fund, interest and income-tax absorbed £26,785, so that, after allowing for £1,651 tax deducted from interest on stock, the deficit on the year's working was £316. Since, however, £4,244 was spent in new services, extensions and conduits, there was actually no loss for the 12 months. During the last four years the reserve and renewals fund has been reduced from £39,000 to £24,469. The Summer Time Act, was likely to produce a loss in residential districts during the summer months of not less than 10 per cent. of supply, increasing to over 20 per cent. in the important shopping areas.

Derby.—PROPOSED LOAN.—The Electricity Committee has decided to apply to the L.G.B. for sanction to a loan of £9,000 for mains and motors.

Edinburgh.—ANNUAL ESTIMATES.—The estimated expenditure of the electricity department for the year 1916-17 is £92,000, as against £84,650 estimated last year, and an actual expenditure of £84,000. Revenue is estimated at £149,920, as against last year's estimate of £148,860, and an actual income of £147,212.

The Electric Lighting Committee recommends the acceptance of the estimate for additions to McDonald Road power station, amounting to over £1,300. The additions have been necessary owing to the increased heavy output.

Glasgow.—YEAR'S WORKING.—At a meeting of the Electricity Committee on Tuesday (July 25th), the annual accounts and report on the working of the department for the year—some of the principal items of which have already been published in the REVIEW—were submitted. It was reported that the gross revenue amounted to £530,720, an increase of 30 per cent., as compared with the year 1915-16. The working expenditure amounted to £322,651, an increase of 47 per cent. The gross balance was

£208,068, from which was deducted—interest on loans £72,233, sinking fund £72,413, and depreciation £58,105, leaving a surplus on the year's operations of £5,317. The Committee has fixed contracts for coal at a considerable increase over last year's prices, but recommends that the rates of charge be the same as last year. The number of consumers at May 31st, 1916, was 33,605, as against 32,030 at May 31st, 1915; the quantity of electricity sold to private consumers during the past year was 110,488,622 units, an increase of 24,769,827; 20,358,906 units were sold for lighting and realised £224,973 and 90,129,716 units for power and heating from which a sum of £285.249 was derived. The number of motors in use was 11,472 of a total H.P. of 84,744. The number of electric street lamps was 1,856, of which 1,472 were arc lamps, and 384 pillars with metal-filament lamps. In compliance with the regulations regarding street lighting, most of the arc lamps had been substituted by metal-filament lamps. The total connected load was 109,370 KW. The maximum load was 45,880 KW.

Grimsby.—Curtailed Lighting.—Since the Summer Time Act came into operation, there has been a saving of 12 per cent. on the amount of electric current consumed for lighting.

Hampton.—Price Increase.—The Electric Supply Co. has informed the U.D.C. that the charges for current for all purposes have been further increased by 10 per cent., making a total of 20 per cent.

High Wycombe.—Street Lighting.—With reference to the settlement of charges for street lighting, which was deferred pending the result of the action between the Leiston Gas Co. and U.D.C., the T.C. has decided to offer the electricity company, without prejudice, (1) £100 per quarter, and proportionate for any less period; (2) 15s. per lamp per quarter, and proportionate for any less period for each lamp lighted. The Electric Light Committee is of opinion that the claim of the company against the Council is not identical with the facts in the Leiston case.

Hull.—The B. of T. has extended the Kingston-upon-Hull Electric Lighting (Extension) Orders, 1914, for one year.

Llandrindod Wells.—Price Increase.—Owing to the proposal to increase the price of electricity from 6d. to 7d. per unit, the U.D.C. has discussed the matter with the electric light company, and the ratepayers are now to be consulted on the subject.

Llandudno. — Price Increase. — The Council has decided to increase the price of electricity.

The Electricity Committee has decided that, as there had been transferred from electricity profits towards the relief of the rates nearly £4,000, a contribution should now be allocated from the rate fund towards the deficiency on the undertaking, and that the loss of £1,499 be met by transferring £1,225 from the reserve fund and £274 from the rate fund, the latter sum being required to cover the cost of loan charges applicable to public lighting. It has been also decided that no further profits from the electricity undertaking be allocated towards the relief of the rates, until the reserve fund has been placed on a firm footing.

The light railway company is to be asked to discuss the question of cancelling the existing contract for the supply of current for working the light railway, and of entering into a new contract for a term of years.

London. — Hackney. — Electricity Charges and Gas. Co.—The Electricity Committee reports that it has considered a communication from the Gas Light and Coke Co., with reference particularly to the reduced charges for electricity for lighting, to consumers who use electricity for power purposes; the Gas Co. quotes counsel's opinion that the reduced charge constitutes "undue preference," and is a breach of the Lighting Act and therefore illegal.

The Committee has referred the matter to counsel, and is advised that there is no undue preference, and the company was notified to this effect.

The company's solicitors having written stating that unless the charge is discontinued proceedings will be instituted, the Committee has caused representations to be made, that the present is not an opportune time for litigation upon a subject which had remained unchallenged and undisturbed for so long, suggesting that the matter should remain in abeyance until after the conclusion of the war, but that if proceedings were now commenced the Committee would immediately apply under the circumstances for a "stay."

In reply to the above representations, the solicitors to the company intimate that it is only prepared to delay proceedings upon an undertaking from the Council not to offer during the continuance of the war to further consumers the scale of charges to which objection is taken.

The Committee does not see its way to recommend that any such undertaking should be given, and, therefore, recommends that, in the event of legal proceedings being taken against the Council by the Gas Light and Coke Co., the Committee be authorised to take all necessary steps to defend the action on behalf of the Council.

Shoreditch.—Year's Working.—The report of the year's working of the electricity department to March 31st last shows a gross profit amounting to £14,682; after payment of interest and sinking fund charges, and war allowances, there was a deficiency of £7,851, which will be met out of the reserve fund.

Poplar.—The B.C. is to make application to the L.C.C. for sanction to a loan of £4,512 for mains extensions necessitated by the increasing load in the central area of the borough. The Committee has agreed to the extensions being carried out, and proposes to purchase a site in the neighbourhood of High Street for the provision of a new sub-station, the necessity for which will shortly arise. The Committee is advised by the engineer that plant extensions will be necessary to meet the demands of the winter load in 1917-18.

Islington.—Linking-up Proposal.—The Lighting Committee of the B.C. is suggesting to the St. Pancras B.C. the preparation of a linking-up scheme by the engineers of both authorities. The electrical engineer requires a supply of switchgear in connection with certain mains extensions which he has been authorised to carry out, and is proposing to invite quotations from certain firms.

Marylebone.—A serious breakdown of a trunk feeder occurred, on the 14th inst., in Aybrook and Blandford Streets, and certain rearrangements are to be made, at a cost of £1,100, to avoid future risks.

Hammersmith.—The Electricity Committee reports that the working of the electricity undertaking for the year ended March 31st last showed a net profit of approximately £600. No increase whatever has been made in the charge to general consumers for current supplied during the period under review. The Committee is in communication with Battersea and Fulham B.C.'s, with a view to carrying out the linking-up scheme approved in 1915.

Southwark.—As a result of conferences between Sub-Committees of the Southwark and Bermondsey Councils, arising from an invitation from the latter asking for terms for a bulk supply, the Southwark Committee has decided that it is not practicable to give the suggested supply, and it is understood that it will be given by one of the companies. The question of linking up the two undertakings is to be considered later. The last year's working of the Southwark undertaking resulted in a net loss of £6,678, and the borough treasurer comments on the increased cost of coal and heavy capital charges on plant which there has been little opportunity of using.

Luton.—Proposed Loan.—It is proposed to apply for L.G.B. sanction to £900 excess expenditure on electrical plant. The connections now consist of 73,217 8-C.P. lamps, 6,834 H.P. of motors, and 1,646 KW. of heating.

Manchester.—It is reported that steps are being taken to prepare a petition to the Electricity Committee, urging the Committee to reduce the present minimum charge for current.

Mansfield.—Year's Working.—The annual report on the electricity undertaking, for 1915-16, shows a gross profit of £7,934, as compared with £6,589 in the previous year, and, after payment of interest, £2,979, and contributions to sinking fund, £2,239, a net profit remained of £2,718, as against £1,941 in 1914-15, although the cost of materials and labour had greatly increased. The total units sold were 1,914,754, compared with 1,635,069. Out of the profits it was recommended to pay over to the relief of the rates £1,500, and appropriate the balance of £1,218 to the reserve fund.

Mexborough.—Price Increase.—The Council last week approved an advance in electricity charges to 4d. per unit for lighting, as from June 30th, and revised meter rents.

Norwich.—Annual Report.—The result of the year's working of the Corporation electricity department, to March 31st last, shows gross receipts amounting to £57,487, and working expenses to £32,611, leaving a gross profit of £24,876; interest and sinking fund charges absorbed £20,373, and the balance of £4,503 is carried to the appropriation account. From the balance £416 is to be expended on a workshop, £2,023 added to the depreciation fund, and the remainder carried forward. The Electricity Committee reported that the figures for the output, as compared with the previous year, show an increase of 3·3 per cent. While nothing has been used for public lighting, the amount of 650,125 units supplied for this purpose in the previous year has been more than made up for by the increased output for power, which shows an advance of 19 per cent.; substantial progress has been made in other directions, principally in the use of electricity for radiators and electric fires, both for private and business premises. The depreciation fund now amounts to £8,000. The report states that the 2,000-KW. generating set, due for completion in 1912, still remains in an unsatisfactory condition, and that the 3,000-KW. set had been operating at reduced efficiency, owing to a breakdown which could not be rectified for some time, due to prevailing conditions.

Poole.—The Bournemouth and Poole Electricity Supply Co. has sent to the Harbour Commissioners six months' notice to terminate an agreement with reference to the lighting of the harbour. A fresh agreement was enclosed, but the Commissioners decided not to sign it at present, but to make inquiries as to the method and cost of lighting the harbour.

Rawtenstall.—Street Lighting.—The T.C. has decided that the charges for electric lighting in the main streets should be as follows:—For 50-C.P. lamps, £1 18s. 9d. per year of 2,500 hours; for 100-C.P. lamps, £2s. 5s. 9d. per year of 2,500 hours; these charges to include maintenance. It was also agreed that the following amount shall be allowed or charged for every hour under and over the 2,500 hours:—For 50-C.P. lamps, ·05d. per hour; for 100-C.P. lamps, ·09d. per hour.

Southampton.—In view of the loss sustained on the past year's working of the electricity undertaking, the Electricity Committee has resolved to charge an additional 10 per cent. to all consumers, making in all 20 per cent., and that the administration of the undertaking be investigated.

South Wales.—The B. of T. has extended the Cowbridge and Penybont E.L. Order, 1914 (South Wales Electrical Power Distribution Co.), for one year.

South Yorkshire.—Electric Winder.—At the new accommodation shaft of Messrs. Newton, Chambers & Co., near Wentworth station, an electrical winding plant has been started up. The winder has two 10-ft. diameter drums, driven by a 330-H.P. Westinghouse slip-ring motor.

Tasmania. — Great Lake Scheme. — The Government hydro-electric power scheme was officially inaugurated in May, by the Governor-General. It is estimated that the Great Lake will give 35,000 H.P., and the River Ouse a similar amount. The scheme was originally initiated by the Complex Ores, Ltd, a Melbourne company, which later disposed of its concession to the State. The Great Lake is situated near the centre of Tasmania, at an elevation of 3,250 ft., and discharges into the River Shannon, which, at a point 5 miles south of the lake, is about 1,300 ft. above the adjacent River Ouse. By constructing a dam, 11 ft. of water has been added over the 50 sq. miles of the Great Lake, and 5 miles down the Shannon a diversion weir has been constructed, turning the water through a canal 3½ miles, into a reservoir 380 acres in extent. From the latter a 4-ft. diameter wood stove pipe runs 5,660 ft., and eventually connects to two steel pipes leading to two 4,900-B.H.P. water turbines in the power station. Power is transmitted to Hobart, a distance of 62½ miles, at a pressure of 88,000 volts, the two three-phase lines being supported on steel towers spaced about 660 ft. apart. Copper transmission lines are used, carried on suspension insulators. At Hobart, a sub station at the New Town, steps down the pressure to 6,600 volts for distribution to the various sub-stations.—*Com. Engineer.*

Thornton.—The B. of T. has extended the period of the Thornton Electric Lighting Order, 1914, by one year.

Tottenham.—Street Lighting. — The North Metropolitan E.P. Supply Co. has declined to make the U.D.C. any allowance on the account for public lighting for the December quarter last.

U.S.A.—According to the *Electrical World*, a campaign is in progress with a view to inducing Congress to increase the Niagara water diversion from 15,000 to 20,000 cb. ft. per second, the maximum fixed by International Treaty. The additional water would generate 80,000 H.P.

A denial is given to the report that the Canadian Niagara Co., if it does not supply the requirements of the Ontario Hydro-Electric Commission, may have its licence to export power to the States revoked.

The Commission wants 50,000 H.P. by December, and the company is said to have offered 32,000 H.P. now, while with new plant being installed, it is said that 75,000 H.P. will be ready in December. The Canadian Niagara Co. exports 75,000 H.P., mostly to Buffalo, 25 miles away.

Walthamstow.—Loan Sanction.—The L.G.B. has sanctioned the borrowing of £2,635 for control switches, &c., for the street lamps.

Warrington.—Price Increase.—The Corporation has decided to increase the charges for electric current, as from August 1st next, by 5 per cent., except in cases provided for, in which the charges for current are regulated by a coal clause.

West Ham.—Annual Report.—The year's working of the Corporation electricity department, to March 31st last, shows a total income of £143,611, as compared with £134,074 in 1914-15, an increase of £9,537. The working expenses were £120,066, as against £96,350, an increase of £23,435, principally due to the extra cost of coal. The gross profit amounted to £23,545, as against £37,443, a decrease of £13,897. After deducting interest, sinking fund, war allowances (£4,216), there is a deficit on the year's working of £26,202. The total number of units generated, 44,024,200, was an increase of 1,528,919 units; of this, power consumers accounted for 27,205,384 units; tramways for 5,429,098 units; and private lighting, 2,725,204 units; the total maximum demand was 12,225 KW. As regards the deficiency, £20,300 is provided for in the rates estimate for the current year, and the balance of £5,902 is to be included by the Electricity Committee in the supplemental estimates in September.

Willesden.—Proposed Loan.—The Council is recommended to apply for sanction to borrow £828 for H.T. mains.

York.—The B. of T. has extended the period of the York Electric Lighting (Extension) Order, 1914, by one year.

TRAMWAY and RAILWAY NOTES.

Bristol.—Tramway Purchase.—The Tramways Option Committee reports that since its appointment in February, 1913, to consider the question of purchasing the Bristol tramways, the cost incurred has been £8,068, of which £2,946 was directly incurred by the Committee in obtaining information, while the remainder represents the costs of obtaining the Bristol Corporation Tramways Act, 1914.

Croydon.—Year's Working, &c.—The special report of the Tramways Committee upon the recent strike, which it was claimed had involved no loss upon the working, again came before the Council on Monday. The Committee recommended increased wages and improved conditions, and that this cost should be met by a shortening of the fare stages. On the penny fares the proposals represented an increase of 30 per cent. A sharp discussion was closured, and the report was adopted in its entirety by 36 votes to 15. The 'bus companies, it was said, were ready to fall into line with the new fares.

At the same meeting it was decided to revise the existing fares for through running with the S.M.T. Penge and Upper Norwood system.

The annual report of the tramway manager (Mr. T. B. Goodyer) was received. Covering the year ended March 31st, it showed total receipts of £94,416, and after deducting working expenses, £72,509, and war allowances, £4,982, and bank interest on income-tax on stock, there remained a gross balance of £18,278. Interest charges, sinking fund, and taxes reduced this to a net surplus of £844, which was carried to the renewals fund. Despite the strike, the receipts showed an increase over the previous year of £5,801. The passengers carried numbered 21 millions.

Edinburgh.—Tramway Report.—In view of the expiry of the lease in 1919 in favour of the Edinburgh and District Tramway Co., the Corporation recently instructed its engineer, with Mr. J. B. Hamilton (Leeds) and Mr. Brodie (Liverpool), to report on the methods of traction which might be adopted. They express the view that it is possible to arrange for an electrical system to be installed without interfering with the cable cars up to the expiry of the lease. The Corporation, accordingly, may proceed with its arrangements for the new system independently of the tramway company. They also state that they consider it is desirable to have only one system throughout the city, and that, while it would be possible to operate the electric system in such a way that there would be no overhead wires in the central parts of the city, it could not be put into operation immediately on the expiry of the lease. What is suggested as a possibility is that the overhead system might be introduced all over, so that there would be no delay in securing a sufficient service, the construction of underground electrical sections being proceeded with later, if that were desired. The report is an interim one only, and the advisers state to the Tramway Committee that they cannot submit their full report until September. Meanwhile, the Council will consider the report; the prevailing feeling is that electric traction should be introduced at the earliest possible moment.

London.—On Monday last an L.C.C. car was descending a hill at Abbey Wood, when, the brakes failing to act, it left the track on a curve at the bottom of the hill, ran on to the pavement and overturned, a number of passengers being more or less seriously injured.

Manchester.—Wages Award.—The Committee on Production has issued its award on the application of the Tramway and Vehicle Workers' Union for an additional war bonus of 5s. per week. Juniors from 18 to 21 years of age are to have a further increase of 1s. per week (making 2s. with the previous bonus), and seniors an increase of 2s. (making 4s.), the maximum wage being 42s. No additional war bonus is granted to women workers. Drivers, conductors, timekeepers, ticket and motor inspectors, depôt clerks, shed men, freight van drivers, overhead motor van and wagon drivers, and parcel dispatchers are included in the grades to receive the additional advances.

Rawtenstall.—Fare Revision.—At the Council meeting on the 21st inst., the chairman of the Tramways Committee mentioned, in regard to the proposal to increase the fares, that since the tramways started they had made a heavy loss, involving the rates to the extent of £11,954. At present a person could ride nearly half as far again in Bacup for 1d. as in Rawtenstall, and it was proposed by Rawtenstall (which runs the tramways) to equalise the distances from Bacup to Rawtenstall. They were not making a profit out of Bacup, the best paying lengths being from Rawtenstall to Waterfoot and Rawtenstall to Lockgate. He said the only way they could settle the matter would be by arbitration, and they would have to apply to the Board of Trade to appoint an arbitrator, who would come down and decide what should be done.

Southampton.—Year's Working.—The report of Mr. W. T. Robson, general manager, on the working of the Corporation tramways for the year ended March 31st last, shows record receipts amounting to £79,828, and a gross profit of £26,854, which, besides providing for interest and sinking fund charges, allowed of £4,460 being contributed to renewals, £5,000 in aid of rates, and other expenditure amounting to over £1,900. Some £8,668 capital expenditure has been met from revenue, and £13,160 credited to renewals. The passengers carried numbered 15,494,366, an increase of 2,228,651, and the mileage run was 1,636,103, a decrease of 67,000 miles. Mr. Robson draws attention to prospective renewals

expenditure of £30,000, and suggests ample provision for this fund in future. Over 60 female conductors and eight girl clerks are employed now, owing to the deficiency of male labour. The report is a comprehensive one, including paragraphs headed "social club," "bulb show," and "concerts." We note that the Edison accumulator tower wagon has given much satisfaction, and mention is made of the great advantage of having electric light available for night repairs, even when the wires are not alive. An interesting paragraph deals with the future, in connection with which Mr. Robson urges the necessity of finding means to avoid the great obstruction caused by the Bargate, the evil influence of which has apparently extended to the cars, which, we gather, are of a peculiarly uncomfortable type, presumably owing to space restrictions. He suggests that commodious top-covered cars, and open toast-rack cars for summer use, be adopted in future on various routes which presumably avoid the objectionable Bargate.

South Shields.—Year's Working.—The annual report on the working of the Corporation tramways during 1915-16 shows a total revenue of £41,826, an increase of £1,981 on the previous year; the gross profit amounted to £15,509, and after deducting interest, sinking fund, and other charges, the balance, £6,504, was appropriated as follows:—£2,400 to the relief of rates, and £4,104 to the reserve fund. During the year, 11,163,378 passengers were carried, as against 10,479,421 in the previous year; the average traffic receipts amounted to 12·0237d. per car-mile. The cars ran 824,887 miles, a decrease of 102,841 miles as compared with 1914-15. The passengers carried show an increase of 20 per cent., not including 15,900 soldiers carried free whilst on duty.

West Ham.—Year's Working.—The expenditure on revenue account of the tramway undertaking, for the year ended March 31st last, shows an increase of £4,990 as compared with the previous 12 months, the figures being £124,926 and £119,935 respectively. Allowances to men on active service amounted to £13,318, against £6,031 in the previous year. The total income amounts to £164,110, as against £152,212 in 1914-15, an increase of £11,898. The above result leaves a gross profit of £39,184, as against £32,276 for the previous year, an increase of £6,908, or, after including allowance to men on active service, a decrease of £378, carried to net revenue account. After allowing for various charges on this account, there remains a net profit on the year of £2,855, but if the allowance of £13,318 to men on active service is included, there is a deficit of £10,462. The Tramways Committee recommends that the surplus should be carried forward towards special expenditure already incurred.

TELEGRAPH and TELEPHONE NOTES.

A Transcaspian Telegraph Cable.—A project is now being worked out in Tiflis for laying a telegraph cable across the Caspian Sea from Baku to Krasnovodsk. The *Baku* says that this cable will serve as a link of the new telegraph line connecting the Central Asian Dependencies of the Empire with the centre. At present this service is effected exclusively through Samara, which route is much overloaded. The new cable is expected to be very beneficial to Baku and district, for the scheme includes an overhead line between Baku and Petrograd to ensure direct communication between these two points. Till now Baku has communicated with Petrograd through Rostoff on the Don, and Moscow. The execution of the project is expected to cost four million roubles, one million of which will be for the cable, and three millions for the overhead line in two directions—Baku-Petrograd and Krasnovodsk-Tashkent. Notwithstanding the state of war, the scheme is expected to take effect in 1917.

Australia.—Troops are to be raised to reinforce a Wireless Signal Squadron that has been organised for service under the Government of India.

An engineer named H. A. Livermore has been fined £10, with five guineas costs, for being the possessor of wireless apparatus without a licence. The apparatus was of small power, such as would be set up by an ordinary amateur; there were no aerials or detectors, and the apparatus would not receive signals.

A report has been received from Mr. Balsillie, the consulting expert on wireless telegraphy, who has been conducting experiments for some weeks at Bookaloo with the object of bringing about the artificial precipitation of moisture from the atmosphere. He has made eight experiments with charged elevated conductors, and it would appear that certain rainfall has resulted, but he is unable to prove it at present.

Hull.—The accounts of the first year's working of the Hull Corporation telephones since the Corporation took over the Post Office telephone service show that the income on revenue account for the year amounted to £56,228, and the expenditure was £32,978. The gross profit amounted to £23,250, compared with £24,000, the amount estimated at the time of the purchase. The expenditure includes a war bonus of £1,324 granted to the staff, and special charges of £267 for works of protection. Loan charges amounting to £18,879 have been met, and a sum of £726 has been allowed for income-tax. The balance on net revenue account is £3,645.—*Leeds Mercury.*

Petrograd.—The telephone business in Petrograd is becoming disorganised in every direction, says a note in the *Novoie Vremya*. It has been found impossible to reduce the interior administration to order; and as to the business of the concern, up to 1,000 new subscribers cannot be connected to the main system because there is no apparatus. The only contractor for telephone apparatus, "Heissler," fails to execute orders, pleading work for the national defence. On May 27th (o.s.) the Ministers of the Interior and War were appealed to by the city governor to lend their assistance to the execution of the orders.

Railway Telegraphs.—Before the Railway and Canal Commission on Monday, an agreement between the Metropolitan Railway Co. and the P.M.G. was under consideration. According to the *Times* report, the agreement provided for the free carriage of men and stores for the maintenance of the "lines of telegraph of the Postmaster-General"; the company contended that the clause in question only related to the telegraphs along the particular railway (Aylesbury and Buckingham) concerned, whereas the P.M.G. claimed that it related to all his telegraph lines. Judgment was given in favour of the railway company,

Telegraph Bill.—A Telegraph (Construction) Bill has been introduced into the House of Commons to amend the Telegraph Acts, 1863 to 1915, with respect to the construction and maintenance of telegraph lines.

CONTRACTS OPEN and CLOSED.

OPEN.

Australia.—August 16th. P.M.G. Distilling apparatus (Schedule 502), telegraph and measuring instruments (Schedule 498). See "Official Notices" June 16th.

Sydney.—August 17th. Portable internal-combustion engine and dynamo (2½ kw.) for the Departmental Stores, Sydney, for P.M.G.*

August 24th. P.M.G. Automatic switchboard and apparatus for North Sydney Exchange. Schedule No. 511.*

Perth.—October 4th. Deputy P.M.G. Telegraph and telephone measuring instruments and parts. Schedule 501 W.A.*

Barking.—August 15th. Electricity and Tramways Committee. Cables, switchgear, and transformers. See "Official Notices" to-day.

Basingstoke.—July 28th. Wiring the Conservative Club for electric light. Mr. A. E. Grant, Secretary.

New Zealand.—Invercargill.—September 28th. Borough Council. Steam turbo-alternator, condensing plant, and switchgear. Specifications from the Tramway Office. Contract No. 40.*

Specifications for the items marked * can be seen at the Board of Trade Commercial Intelligence Branch in London.

CLOSED.

Argentina.—An order (£70,000) has just been placed by the Buenos Aires Western Railway with the Leeds Forge Co. for under-frames and bogies for motor coaches, and bogies for trailer coaches. These are for rolling-stock now being built in England in view of the electrification of a portion of the Western Railway's system.—*Times.*

Cape Town.—Electric Utility Co., wiring for electric lighting, telephones and bells, of the residence at Newlands of Mr. A. L. Chiappini, £320.

Government Contracts.—The following tenders have been accepted during June, 1916:—

War Office.

X-ray apparatus.—F. R. Burt & Co., Ltd.
Electric cable and wire.—W. T. Henley's Telegraph Works Co., Ltd.; Midland Electric Wire Co.; Ward & Goldstone; Western Electric Co., Ltd.
Electric cells.—Siemens Bros. & Co., Ltd.
Electric generators and motors.—General Electric Co.
Electric lamps.—C. Collins, Ltd.; Efandem Co., Ltd.; J. & R. Oldfield, Ltd.
Telephone switchboards.—Automatic Telephone Mfg. Co., Ltd.
Tungsten tubes.—F. R. Burt & Co., Ltd.; A. E. Dean.
Works services.—Electric light installation at Rendcombe: Edmundson's Electricity Corporation. Electric lighting at Wye: H. J. Cash & Co., Ltd.

Post Office.

Telegraph apparatus.—Gill Telegraphic Appliances Syndicate.
Telephone apparatus.—British L. M. Ericsson Mfg. Co., Ltd.; Peel-Conner Telephone Works Co., Ltd.; Western Electric Co., Ltd.
Iron arms.—Siemens Bros. & Co., Ltd.
Telegraph cable.—Telegraph Construction & Maintenance Co., Ltd.
Telephone cable.—B.I. & Helsby Cables, Ltd.; W. T. Glover & Co., Ltd.; Union Cable Co., Ltd.; Western Electric Co., Ltd.
Telephone cords.—London Electric Wire Co. & Smiths, Ltd.; Phœnix Telephone & Electric Works, Ltd.
Telephone mouthpieces.—North British Rubber Co., Ltd.
Cable distribution plugs.—B.I. & Helsby Cables, Ltd.
Bronze insulated wire.—Siemens Bros. & Co., Ltd.
Galvanised-iron wire.—Dorman, Long & Co., Ltd.; Johnson & Nephew, Ltd.; Rylands Bros., Ltd.
Battery zinc.—Eyre Smelting Co., Ltd.; Siemens Bros. & Co., Ltd.

London.—HAMMERSMITH.—Electricity Committee. Contract with the British Electric Transformer Co. for 12 months' supply of transformers. It is proposed to purchase five 200-KW. transformers almost immediately for £840.

MARYLEBONE.—B.C. Electricity Supply Committee :—

Alfred Blackmore & Co.—6,000 tons Low Laithes Yorkshire washed nuts, and 4,000 tons 1½-in. Yorks. and/or Derby nutty slack, to be delivered over 12 months.

Charrington, Sells, Dale & Co.—2,000 tons 1½-in. Langwith nutty slack, for delivery from October to February.

New Zealand. — DUNEDIN. — In view of the present unsatisfactory conditions as regards prices and shipment of material, none of the tenders received for six electric tramcars, &c. for the City Council, has been accepted. "Imperial Trade Correspondent."

Southampton.—T.C. Education Committee. Accepted tender : H. C. Taplin, at £251, for installing electric light at the Eastern District School. Mr. A. Kingman quoted £372.

Spain. — La Sociedad Espanola de Electricidad, of Madrid, has lately secured a contract from the Sociedad Metalurgica Duro-Felguera for the electrical equipment of a large rolling mill. The latter will be driven by a direct-coupled electric motor of 2,000 H.P.

NOTES.

Decimal Coinage and the Metric System.—At a meeting on July 20th the Court of Common Council of the City of London resolved that, in view of the great advantages which would accrue to British commerce in foreign markets by the use of a decimal system of coinage and weights and measures, it was desirable that steps should be taken to ensure its immediate introduction, so that it might be already in operation at the conclusion of the war. A copy of the resolution was forwarded to the Prime Minister and the President of the Board of Trade.

In the course of his valedictory address as retiring President of the S.A. Institute of Engineers, Mr. W. Ingham expressed the view that South Africa should seriously consider whether the time was not opportune for introducing the metric system of weights and measures, and decimal coinage. After studying the subject for over 20 years, he had come to a conclusion favourable to the system.

Russian Electrical Municipalisation.—A note in the *Novoie Vremya* says that the preceding Duma devoted much time and trouble to considering a project for the municipalisation of electrical enterprises. In the estimates for 1916 for the furtherance of this project, amongst others, there was set down 548,195 roubles. At the sitting of the Duma on May 4th, Chief Engineer Smirnoff, who built the first electrical station in Petrograd for public use, made a declaration on the decision of the Duma regarding the purchase of electrical concerns, and on the cessation at present of progress in this direction. In deciding on the purchase, the Duma had in view reduction in the cost of using electrical energy and the extension of such use ; but at present, and even in the near future, for want of means, the project cannot be carried out, whilst owners, under the pretence of a rapid transfer, are all limiting the output of their stations, which may have a bad effect on work that is being carried out for national defence. In view of all this, Mr. Smirnoff asked a reduced credit in the estimates for 1916 for preparing the project. This proposal will be examined by the Executive Committee.

I.E.E. Wiring Rules, Seventh Edition.—We have been asked to publish the following corrections :—

Rule 117 (*b*), line 1, for "Fitted with" read "Controlled by."

Rule 121 (*b*) applies to lighting circuits only.

Page 42, line 30, for "Decks" read "Desks."

Gravitation and Electrical Action. — The following interesting letter appears in *Science* for July 7th :—"In a paper to be published by the Academy of Science of St. Louis, evidence will be presented which appears to show conclusively, that gravitational attraction is diminished by electrical charges on the acting masses. The suspended masses of the Cavendish experiment are wholly enclosed in a shield of sheet metal. The small observation window is covered with wire gauze. When a knob terminal connected with the influence machine is moved towards or away from a knob terminal connected with the large attracting masses, the suspended masses slowly move to and fro around the vertical line of suspension. No disruptive discharges occur. It is found that gravitational attraction is decreased by either positive or negative electrification. By the to-and-fro movement of the knob terminal, the amplitude of vibration can be gradually increased from 2·5 minutes of arc to 50 minutes. It has been established by experimental methods that these results are not due to heat effects.

"FRANCIS E. NIPHER."

A New Electro-Textile Machine.—A recent issue of the *Textile Recorder* contained a description of an improved "reaching" machine (by Messrs. Moore & Avery, Blackburn). The machine selects and hands over the threads of warp to the drawer-in, who draws them through the healds and reeds in preparation for the after process of weaving. It is interesting to note that the thread selecting mechanism consists of a 1/30-H.P. electric motor with automatic switchgear mounted on a travelling carriage to enable it to move across the width of the heald, and that if it selects the threads faster than the operative can deal with them, the motor is automatically stopped, until threads are taken from the feeding wheel, when it automatically starts again.

How to Treat Stored Accumulators.—Bearing in mind that the result desired is always the preservation of the accumulator plates, the advice always depends upon whether the owner desires to keep his accumulator in good condition with as little disturbance as possible of its working state, or whether he desires to store it for a long period of time, and does not object to the trouble involved in removing the acid and refilling when the battery is to be put in use again.

There are two methods—the dry system and the liquid system—the former being the better. For the dry system give the battery a thoroughly good charge, in order to bring all the plates into a satisfactory state. Then remove the acid, fill up again with pure water, discharge the battery for a few hours until the voltage has fallen by 10 per cent., and then immediately empty out the water, let the cells drain as much as possible, remove the terminals, wash away any traces of acid on the top covers, put a little vaseline on the terminal stems and all connections, and store in a place free from dust.

The object of discharging after the water has been added is to avoid heating of the negative plates when the cells are dry. The object of putting water in the cells for the discharge is for the purpose of thoroughly removing the acid in the pores of the plates. On no account leave the water in the cells, whether charged or discharged, as they will rapidly sulphate if you do. Advice is sometimes given to fill cells with water, and leave it in. This is absolutely wrong.

The liquid system is as follows :—See that the plates are well covered with acid, but keep it below the lead connecting-bars inside the cells. Charge up the battery until it is thoroughly well charged. Remove the terminals and vents, carefully clean the tops of cells, vaseline all metal parts, and store in the dark, with protection from dust. A periodical charge is beneficial, but not always necessary ; this depends upon the condition of the battery when stored, the type of plates, and the amount of loose sediment there may be in the cells. If the voltage is found to be low after a few weeks, it is a sign that the battery requires attention.—*The Motor.*

Tender Memories. — The following comes to hand, described as "a (more or less) poetic effusion," from a Manchester Corporation electricity works employé, at present on active service on the Suez Canal Defences :—

REMEMBRANCE.

I'm soldiering in Egypt, but I often think of home, and I think as well of "where I used to work"
(I ought to say "the place at which I used to *think* I worked") ere I got the job of watching Johnny Turk.
For I once had the delusion that I really earned my pay, and I wore a "Village Blacksmith" sort of air,
But I've recently discovered that my job was really "soft" and I wish with all my heart that I were "there."

I march across the desert underneath a broiling sun, with my rifle slung, and pack upon my back.
And the waves of sunlight on the sand are quivering, till the heat makes me think that very soon my throat will crack ;
And I watch a string of camels pass with sympathetic gaze, as with awkward gait they "hoof it" o'er the sand,
And the great Truth dawns upon me as it never did before, that Old England is a happy, happy land.

All day I'm using pick and spade and filling bags with sand, while the bored N.C.O.'s are looking on,
But I'm thinking oft of "kilowatts" and "Units sent to Subs," and when evening comes and all parades are done
I lie and dream of Turbos and Reciprocating Sets and I walk along the Switchboard in my sleep ;
Then "Reveille" breaks my slumbers, and I tumble out of bed ; then I drink my cup of "Gunfire" tea and weep !

I used to think the Boilerhouse a sultry sort of place. (It will be a Winter Gardens after this)
And a good old steady downpour such as Manchester oft sees will be looked upon as real unalloyed bliss.
O, there'll be a good time "bardeen," and we'll all feel "quice keteer," when the order comes to "Imshi" o'er the foam.
When the boys are back in Blighty and they taste some "Blighty" beer, they'll be all "magnoon" with joy to be at home.

WILLIAM TRANTER.

"Bardeen," = Arabic, "Shortly."
"Quice Keteer" = Arabic, "Very good."
"Imshi" = Arabic, "Hook it !" "Get out !"
"Blighty" = England.
"Magnoon" = Arabic, "Mad."

Electrical Wages at Edinburgh.—A meeting of the members of the Edinburgh District of the Electrical Trades Union, on Friday night, discussed a number of important questions. With regard to the application for an increase of wages, the secretary reported that employers had granted them ½d. increase from June 16th to September 16th, when another ½d. would be granted, provided the general cost of living had not gone down in the interval. As regards holidays, the meeting agreed to recommend that, with the exception of those who had made arrangements for earlier holidays, the holidays be held between August 5th and 12th. It was pointed out that the employés who were at present engaged upon actual war work would have to postpone their holidays indefinitely, as recommended by Mr. Asquith.

Inquiries.—Makers of the "Star Electrophone," or other efficient aid to hearing for the use of partially-deaf persons; makers of a small plug-fuse, with standard Edison screw, marked B.B.N.O.; and suppliers of the Sutalite lamps, are asked for.

Appointments Vacant.—Fitter (with the rank of chief assistant) for Diesel engines, for the Aylesbury U.D.C. electricity department (50s.); shift engineer, for Portsmouth Corporation tramways; man for X-ray work and male nursing, £2, for the Royal Berkshire Hospital; shift engineer, for High Wycombe. See our advertisement pages to-day.

British Tumbler Switches in France.—A Paris correspondent, who has been disabled by German shrapnel and is now back in commercial life in Paris unable to return to the Front, asks us to put him in touch with a British firm making tumbler switches, desirous of having its interests represented in France.

A.S.E. Funds.—The *Times* states that the funds of the Amalgamated Society of Engineers exceed £1,000,000.

Fatalities.—Considerable attention was paid at an inquest held at Coventry, on the 14th inst., to the question whether a live electric wire in connection with the overhead crane at a local factory was in any way responsible for a man's death.

Dr. Pickup stated that he had come to the conclusion that the man died from heart syncope, the cause of which he could not say. He might have slipped, or felt faint, or he might have touched the live wire, and got a little shock that caused him to fall.

The jury's verdict was that "Death was due to an accident through falling, causing syncope."

At an inquest held at Sheffield, on July 13th, it was stated that Ernest Bage, an electrician, while fixing some new electric wires on the roof at the works of Messrs. Wm. Cooke & Co., Ltd., missed his footing, fell to the ground, and was killed.

An inquest was held last Friday, at Lancaster, concerning the death of a woman named Clarkson (26), an electric crane driver employed at a local factory. When she was ascending a ladder to go on duty in her driving box, a travelling crane knocked her down. She fell about 15 ft., alighting on a girder, and sustained injuries which proved fatal.

Jacobus Rabie, for whom the course of true love appears not to have run too smoothly, declared to one of the daughters of a certain household in an outburst of jealousy that he would—climb an electric light standard. And he did so on the Main Reef Road between Germiston and Malvern. Scaling the pole, he gripped the live wire with both hands, and gave a grim and fatal ending to a Rand Reef romance.

Thomas Crossley, an electrician, his son, and another were drowned last Saturday while fishing in Belfast Lough, during excitement occasioned by the capture of a big conger eel.

J. J. Halliwell (22), electric crane driver, was found dead on the floor of his cabin at the works of the British Westinghouse Co. on Saturday.

Institution and Lecture Notes.—Physical Society of London.—At the meeting held on June 16th, a paper entitled "Experiments with Mercury Jet Interrupters," was read by Capt. C. E. S. Phillips. The paper described an experimental attempt to ascertain the form of the mercury column issuing from a hole in the side of a rotating drum, that was continuously supplied with mercury by centrifugal action. Incidentally a new form of interrupter was introduced, in which the interior was visible through a window in the lid. The usual copper segments were replaced by tantalum, which is not "wetted" by mercury, remains clean and bright indefinitely, and has a high melting point. Experiments with various forms of orifice were described, and it was pointed out that the issuing stream was only slightly affected by this means. An explanation was given of the fact that a vertical slit orifice would not produce a ribbon of mercury, and that no matter how much the diameter of the orifice was increased beyond about 2 mm., the cross section of the mercury column remained unaltered.

Illuminating Engineering Society (U.S.A.).—The Society has decided to hold a series of lectures at the University of Pennsylvania, from September 21st to 28th inclusive, immediately following the annual Convention of the Society in that city. The lecture course will include the principles of illumination and various aspects of lighting practice, and will consist of about 20 lectures by men selected, on account or their qualifications, to deal authoritatively with the several phases of the subject. Associated with the lectures will be an exhibition of the latest developments in illuminating appliances, together with novel applications of light.

The United British Industries' Association.—The *Morning Post* states that Mr. Dudley Docker presided at a luncheon given at the Grand Hotel, last week, to manufacturers who are interested in the movement for starting the United British Industries' Association. A Committee has been appointed representative of British manufacturers, and the British Engineers' Association and the British Manufacturers' Association of 1915 have become affiliated to the new organisation. We gather that considerably more than the required 100 firms, each putting down £1,000, have been enrolled. Our contemporary gives a list of the firms provisionally consenting to become members. They include the British Aluminium Co., Ltd., the British Electrical Federation, British Insulated and Helsby Cables, Ltd., the British Thomson-Houston Co., Ltd., the British Westinghouse Co., Ltd., Crompton & Co., Ltd., Dick, Kerr and Co., Ltd., General Electric Co., Ltd., Greenwood & Batley, Ltd., W. T. Henley's Telegraph Works Co., Ltd., India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd., the Marconi companies, Mather & Platt, Ltd., Willans & Robinson, Ltd., and many more large engineering firms.

Steel Furnace on the Rand.—At the present time a large quantity of old steel shoes and dies is thrown to waste annually on the Witwatersrand, and, although under pre-war conditions it might not be profitable to attempt to remake the waste material into shoes and dies, in view of the present greatly-increased cost of these articles, and also the difficulty of obtaining deliveries, it has been decided to erect an electric furnace and accessory plant for the purpose. The construction of the furnace is now in hand as a department of the Witwatersrand Co-operative Smelting Works, Ltd., under the supervision of Prof. W. Buchanan, who was also the designer, and the scheme is likely to prove a useful adjunct to the mining industry.

Joint Action to Develop Electric Road Motors.—Considerable progress has been made during the past two years by the Electric Vehicle Committee of the Incorporated Municipal Electrical Association in the matter of organising facilities for road transport by means of electric battery vehicles. The constitution of the Committee is on a broad basis. It includes representatives of the parent Association, the Commercial Motor Users' Association, the Royal Automobile Club, the Society of Motor Manufacturers and Traders, the Provincial Electric Supply Companies, the Electrical Contractors' Association, the British Electrical and Allied Manufacturers' Association, the Incorporated Association of Electric Power Companies, the Institution of Municipal and County Engineers, and of the Tramways and Light Railways Association. The chairman of the Committee is Mr. R. H. Chattock, city electrical engineer of Birmingham. The hon. secretary is Mr. F. Ayton, chief engineer and manager of the Ipswich Corporation electric supply and tramway departments.

The electric vehicle has its own special field in goods delivery work in urban and suburban areas, and the excellent results that have, so far, resulted from its use by some of the largest and most up-to-date business firms, would seem to indicate quite a conside able field for its extended employment in the future, not only for the delivery of merchandise, but also for passenger carrying work in and about towns and cities. The economy in operating cost and the simplicity of the mechanism are, of course, the main features of this class of vehicle. While these advantages were manifest in the period before the war, the present scarcity of horses, the high price of fodder, and the rising cost of petrol, very greatly enhance the merit of economy possessed by "the electric."

Electrolytic Treatment of Ores in Australia.—At a meeting of shareholders of the Mount Lyell Mining and Railway Co., in Melbourne, it was stated by the chairman that the arrangements made with the Tasmanian Government for the supply of 50,000 H.P. from their hydro-electric scheme had added to the importance of the options held by the company over the Tasmanian Copper, Hercules, and Primrose mines. Electrolytic treatment of similar ores, he said, was carried on satisfactorily elsewhere on a large scale, and with a supply of hydro-electric power, the production of electrolytic spelter on profitable lines from ores of the West Coast mines was now in sight. The board decided to give notice of its intention to exercise the options conditionally upon raising the necessary capital.

Removing Enamel from Wire.—A manufacturer of magnet wire states that many serious mistakes are made in measuring the diameter of enamelled wires. Many users scrape the enamel from the copper wire with emery cloth or sandpaper. In doing this it is almost impossible to keep from removing some of the copper. If only 0·0001 in. is removed, it will show on a micrometer caliper or wire gauge. Two ways to remove enamel from wire are suggested: One of these is to pass the wire over a bunsen gas flame several times until the enamel melts and drops off; the other is to dissolve it in amyl alcohol.—*Electrical World.*

Volunteer Notes.—1ST LONDON ENGINEER VOLUNTEERS.—Headquarters, Chester House, Eccleston Place. Orders for August by Lieut.-Col. C. B. Clay, V.D., Commanding.

The Headquarters will be closed during August except on Tuesday evenings. The range will be open on Thursday evenings only.

Instruction Classes at Regency Street will be held as usual for Platoons Nos. 9 and 10.

The Camp at Otford will be available until August 31st. Members wishing to attend should enter their names at Headquarters.

Sunday Entrenching Parades. Parade in Uniform at Victoria Station (S.E. and C. Railway) Booking Office, 8.45 a.m.

MACLEOD YEARSLEY, *Adjutant.*

3RD BATT. (OLD BOYS') CENTRAL LONDON VOLUNTEER REGIMENT.—Battalion Orders by Capt. R. J. C. Eastwood (Commandant), Thursday, July 27th, 1916:—

Week-End Parades.—Saturday.—The Battalion will Parade at Wembley Park, at 3 p.m., for Drill under the Commandant.

Entrenching.—A party will parade at Liverpool Street Station (Low-Level entrance, G.E.R.), at 8.40 a.m., and proceed by train for entrenching duties. Those who cannot take the early train will parade at 1.20 p.m.

Sunday.—Parade at Liverpool Street Station (Low-Level entrance, G.E.R.), at 9.30 a.m.

Musketry.—Holland Cup Competition.—Saturday, 29th inst, 9.30 a.m. and 12.45 p.m., report at No. 8 Platform, Waterloo Station. *Sunday*, 30th inst., 9.45 a.m., at No. 8 Platform.

Recruits will Parade at Wembley Park on Saturday at 3 p.m., and Sunday at 11 a.m., for recruit drill.

C. T. COGGIN, *Acting Adjutant, O.B.C.*

Lady Electricians in Meter Departments.—Our contemporary, the *Electrical Times*, recently referred to the employment of girls for fully a year past by the St. Pancras Borough Council's electricity undertaking, for meter reading. This, however, is only part of the story, as only a few girls are so engaged, for three weeks each quarter. Girls were put under training in the first instance on the work of meter maintenance in the workshops, and some are now being drafted to the standardising room.

The St. Pancras electricity department created quite a flutter among the meter manufacturers some years ago, when it imposed a further test on all meters (both overhauled and new) at $\frac{1}{10}$th (2½ per cent.) of full-load rating, and expected them to comply with the same conditions as were stipulated for $\frac{1}{20}$th load by the British Engineering Standards specification. It would be interesting to know that this high standard of working has not been impaired by the training of the girls.

St. Pancras, by the way, has been systematically removing rotor meters from circuit for overhaul in the workshops every four years, as a result of which very few units have been allowed to pass through to customers unchallenged; also, the serviceable life of the meters must be considerably lengthened, which fact should go a long way to appease the manufacturers of those particular meters who may deplore (in peace times—they are otherwise engaged at present) the lack of large orders from St. Pancras for new stock.

The electricity meter doubtless owes its present standard of efficiency, in no small degree, to the foresight of those supply engineers who, recognising the commercial value of efficient meters, have installed the necessary testing plant and imposed stringent conditions, in advance of other authorities.

We congratulate St. Pancras on this further display of initiative in starting the training of girls for meter work, and should like to hear of others who can be placed in the same category; although, like St. Pancras, they individually hide their light under the proverbial bushel, until it is disclosed by an inquisitive push from some quarter. It is a pity, however, that this should be the case, having in view the general interests of the profession.

Electrolytic Disinfecting Fluid.—During the year 1915, according to the report of Dr. F. W. Alexander, medical officer of Health to the borough of Stepney, 36,985 gallons of electrolytic disinfectant were manufactured, making 73,970 gallons as diluted for distribution. The cost was—for materials, £36; electrical energy, £50; total, £86. The plant has now been running ten years, and has manufactured 418,779 gallons of the fluid, at a cost for electricity of £450 and materials £381 (under ½d. per gallon).

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

Central Station and Tramway Officials.—Our Johannesburg correspondent writes:—"Prof. J. H. Dobson, the general manager of the Johannesburg Municipal tramways and electricity department, has been appointed Officer Commanding the S.A. Pioneer Regiment, with the rank of Major. He and his men have been in training for some weeks at Potchefstroom prior to their departure for German East Africa. During Major Dobson's absence, the management is in the hands of Messrs. E. T. Price, the chief electrical engineering assistant; F. Stokes, the mechanical assistant; and G. B. Milford, the tramway manager.

On leaving to take over the management of the East Kent Tramway Co., Mr. T. G. Clabburn, manager of the Peterborough Tramway Co., has been presented by the employés with a rose bowl, &c. He is succeeded by Mr. P. R. Blake, of Deal.

The Aylesbury U.D.C. has increased the salary of Mr. A. H. Fowles, assistant electrical engineer, to £131 10s. per annum.

Mr. A. C. Sussex, electrician with Hill's Plymouth Co., Ltd., of Merthyr Tydfil, who is leaving to take up a position on the staff of Messrs. Guest, Keen & Nettlefold, at Bedlinog, has been presented by the electrical staff with a cabinet of table cutlery.

The Bath Corporation Electricity Committee has appointed Mr. R. F. Sidwell, leading jointer, to succeed the late Mr. D. T. Miles as mains superintendent.

Captain Gray, Accrington's borough electrical engineer, who joined the Howitzer Brigade at the outbreak of the war, was stationed at Woolwich for some time, but is now employed in a munition factory near Morecambe.

The St. Pancras Electricity Committee proposes to increase the wages of Mr. S. A. Creasey, shift engineer, from £2 12s. 6d. to £2 15s. per week, thus placing him on an equality with another shift engineer who carried out similar duties.

Mr. J. S. D. Moffett, general manager of the West Ham Corporation tramways, has been appointed general manager of the Belfast Corporation tramways, at £800 per annum.

The Metropolitan Munitions Committee has communicated to the Marylebone Electricity Committee its thanks for the services of Mr. A. H. Seabrook, whose whole time is now devoted to the work of the Council. The Committee stated:—"Mr. Seabrook's untiring efforts have been of the greatest assistance to the Board, and they desire to place on record their high appreciation of the courtesy of your Council for so willingly loaning his services, and of the whole-hearted manner in which Mr. Seabrook has devoted himself to this important national work."

General.—The Executive Committee of the City and Guilds of London Institute have appointed Mr. W. Eccles, D.Sc., A.R.C.S., M.I.E.E., to the Professorship of Electrical Engineering and Applied Physics at the Institute's Technical College, Finsbury, rendered vacant by the death of Prof. Silvanus P. Thompson, F.R.S. Mr. Eccles is at present University Reader of Graphics at University College, and is the author of a work on *Wireless Telegraphy and Telephony*, and numerous papers and inventions on subjects connected with electrical engineering.

Mr. Francis H. Davies, assistant engineer, Weston Electrical Instrument Co., has been gazetted Lieutenant in the Army Ordnance Department.

Mr. S. R. Mullard, A.M.I.E.E., of the research laboratory, Edison & Swan United Electric Light Co., Ltd., Ponders End, has been granted a temporary commission as Lieutenant, R.N.V.R., attached to the R.N.A.S. Lieutenant Mullard has been actively employed in connection with research work on the Ediswan "Pointolite" (nitrogen) arc lamp. He is being retained by the Ediswan Co., and will thus keep in touch with his laboratory work.

We read in the *South African Mining Journal* that Mr. Bernard Price has been elected President of the S.A. Institute of Engineers.

Roll of Honour.—The death in action, on July 1st, of Captain C. C. May, Manchester Regiment, is reported. He was the only son of Captain C. E. May, New Zealand Forces, and had been district manager for Associated Fire Alarms, Ltd., in the Manchester district since 1911. "Though mortally wounded," his Colonel writes, "he gallantly continued to give orders and encourage his men to the last. Had he lived I would have recommended him for the D.S.O." Born in Dunedin, N.Z., he obtained his commission in January, 1915, and was promoted captain a month later. Previously he had served six years with King Edward's Horse, and at the outbreak of war founded and commanded the Legion of Volunteers in Manchester. Captain May was well known in business circles in Manchester.

Lieutenant A. R. Courtenay, of the General Electric Co., Ltd. (Publicity Department), has been invalided to St. Andrew's Hospital, Malta, from Salonika, but we are pleased to learn that his indisposition is not serious.

Private H. Burniston (26), who has been killed in action, was a draughtsman at the Leeds Corporation electricity works.

Private W. C. McNeil, who has been wounded, was in the employ of the Cremer Lamp & Engineering Co., Armley, Leeds, before enlisting.

Private P. Paley, of the Yorkshire Regiment, who has been killed, was an electrician at Grimethorpe Colliery.

Private S. Greenwood, of the Yorkshire Light Infantry, who has been killed in action, was an electric wireman at Halifax before being called up as a Reservist.

Private C. W. Barker, of the 8th Battalion Royal Fusiliers, and late of the electrical fittings department at the Ediswan Works, Ponders End, has been seriously wounded in France.

Private Frank McGeehan, of the 20th County of London Regiment, who was killed in action on July 15th, was, before the war, employed in the testing department at Hooper's Telegraph & India-Rubber Works, Ltd., Millwall Docks, London, E.

Corporal Reginald Buckley, of the Liverpool Regiment, aged 29, an employé at the electricity works, Waterloo, Liverpool, has been killed in action.

Private M. Haydock (23), an employé of the British Westinghouse Co., Trafford Park, has died of wounds.

Private James Mills, who was formerly employed by the Manchester electricity department, at Clayton, has been killed.

Private James Walker, a worker at the Manchester electricity works, Ardwick, has been killed.

Private Thomas L. Wood, of the Liverpool "Pals," has died of wounds. He was 25 years of age, and formerly employed at the Formby electricity station.

Private J. E. Edwards, of the Manchester Regiment, aged 23, has died of wounds. He was employed at the Manchester Corporation electricity works before the war.

Sergeant James Ward, of the Northamptonshire Regiment, who has been wounded, was formerly employed by Messrs. W. T. Glover & Co., Ltd., Trafford Park.

Bandsman Sidney Morris, of Harpurhey, Manchester, aged 18, who was on the clerical staff of the British Insulated and Helsby Cables, Ltd., Manchester, has been killed.

Private Harry Crowther, aged 22, killed in action, was an employé of the British Westinghouse Co., Trafford Park.

Private John Boardman, of the Grenadier Guards, an employé of Messrs. Ferranti, Ltd., has been killed in action.

Private S. J. Walley, of the Welsh Regiment, killed in action when going to rescue a comrade, was formerly engaged in the electrical department of the Crewe railway works.

Armourer-Staff-Sergeant W. F. Rawson, Army Ordnance Corps, aged 29, for many years employed at the Stuart Street generating station, Manchester, has been killed through the accidental bursting of a gun which was being overhauled.

Private HARRY HOLLINS, of the Manchester "Pals," an employé of Messrs. Boxendale & Co., Ltd., has been wounded. Private ALBERT BROWN, another employé of the same firm, has been killed in action; and Private U. BOOTH, a third employé, has been wounded.

Rifleman W. WOOLHAM, of the Rifle Brigade, now in a Manchester hospital, was formerly employed by the St. Helens Cable & Rubber Co., Ltd.

Private W. H. BARLOW, of the Norfolk Regiment, formerly a draughtsman at the electrical works of Messrs. Laurence, Scott & Co., Norwich, and previously with the Lancashire Dynamo Co., has been killed in action.

Corporal HARRY HOOSE, of the Royal Welsh Fusiliers, aged 22, killed in action, was an employé of the British Insulated and Helsby Cables, Ltd.

Second-Lieutenant CYRIL R. WARD, of the Royal Engineers, killed in action, was educated at Sandbach Grammar School and at the Manchester Municipal School of Technology. He was engaged, prior to the war, with the British Westinghouse Co., Trafford Park.

Private WALTER HEWES, who was formerly employed at the electricity station, Broadheath (Cheshire), has been wounded.

Second-Lieutenant NORMAN HAWORTH, of the South Lancashire Regiment, killed in action, aged 26, was formerly in the employ of Messrs. Siemens Bros., Stafford.

Second-Lieutenant RALPH NESBIT LODGE, of Manchester, a nephew of Sir Oliver Lodge, is reported missing. Before the war he was employed by the General Electric Co., Ltd.

Sergt. H. B. CROSFIELD, of the Manchester Regiment, an employé in the Manchester electricity department, who was mentioned in dispatches by Sir Ian Hamilton, has been killed, aged 26.

Private A. E. JOHNSON, of the Lancashire Fusiliers, who was an electrician with Mr. W. Brierley, of Bury (Lancs.), has fallen in action in France.

Private L. F. WATKINSON, who was, on his enlistment, in the office staff of the Leicester Corporation electricity and tramway department, has been wounded, and is in hospital at Lichfield.

Private G. FAIRHURST, of the R.A.M.C., who was in the electrical department of the Vulcan Foundry Co., Ltd., of Earlstown, has died of dysentery at Amara, Persian Gulf.

Second-Lieutenant STEPHEN F. WEEKS, B.Sc. (Lond.), of the Royal Engineers, killed in the advance in France, was a nephew of Ald. G. Weeks, of Messrs. G. Weeks & Son, electrical engineers, of Bromley (Kent). He was 28 years of age, and came home from Siam to join the Forces.

Private RICHARD HARDMAN, of the Royal Scots, wounded at La Boisselle, was formerly engaged as an electrician with Messrs. Smith, at Pendleton (Lancs.).

Private H. W. RAWLINGS, who was on the staff of the Cambridge electric light works when he enlisted in the Suffolk Regiment, was wounded in France, and is in hospital at Birmingham.

Private G. L. RICHARDSON, of the Oxford and Bucks Light Infantry, who was, prior to the war, an employé of Messrs. Hill, Upton & Co., electrical engineers, of Oxford, has died in hospital.

Private W. BAILEY, of Swinton, an employé of the Chloride Electrical Storage Co., Clifton Junction, has died of wounds, aged 19.

Sapper E. W. LUCAS, at one time a partner in the firm of Messrs. Walmsley & Lucas, electricians, Pendlebury, has been killed in action, aged 29.

Private H. NOBLE, Bermuda Rifle Volunteer Contingent, attached 1st Lincolnshire Regiment, who was with the Halifax and Bermudas Cable Co., was killed in France on July 3rd.

Captain H. K. TURNER, aged 25, who, according to the *Times*, was killed in action on July 16th, was a director of Messrs. E. R. & F. Turner, of Ipswich.

The *Times* states that Second-Lieutenant J. H. PARR-DUDLEY, Royal Fusiliers, who was killed in action on July 1st, spent a year at the Faraday House Electrical Engineering College, where he took a silver medal; he received a commission in January, 1915.

Private HAROLD GORDON TAYLOR, London Scottish, late assistant draughtsman at Fulham electricity works, who was wounded in four places in the charge at Gommecourt Wood, on July 1st, is lying in the London Hospital, progressing favourably.

Obituary.—SIR WILLIAM RAMSAY.—By the death of Sir William Ramsay, on Sunday last, we have lost perhaps the most distinguished of our chemical physicists, and one who had, moreover, rendered unsurpassed services to the Allied cause by his strenuous advocacy of a closer blockade, and of reform in our educational methods. He was born in Glasgow in 1852, educated at the Universities of Glasgow, Heidelberg, and Tübingen, and, after serving on the staff of Anderson's College and the University in his native city, became Professor of Chemistry at and Principal of University College, Bristol. From 1887 to 1913 he occupied the Chair of Chemistry at University College, London, where most of his most striking discoveries were made. Jointly with Lord Rayleigh he discovered argon, a new constituent of the atmosphere, and later he isolated helium, neon, krypton, and xenon. In 1903, Sir William Ramsay proved that helium was a product of the disintegration of radium, and carried out further research into the transmutation of the elements. He received many honours in recognition of his scientific achievements, including the Nobel prize in 1904, and was the author of important works on chemical subjects. His work in connection with radium and radio-activity, in which he collaborated with Prof. Soddy, was of the highest order. He was also interested in the conservation of our stores of coal, and proposed a scheme for the distillation of coal in its natural bed, the resulting gases being utilised on the surface for the generation of electrical energy. Sir William was a talented musician and an excellent linguist. He leaves a widow and two children.

MR. EDWARD ROCK.—Mr. E. Rock, electrical engineer, of Workington, died on July 21st from injuries received whilst cycling on July 4th.

MR. H. F. C. EGGERS.—The *Commonwealth Engineer* reports the death, which occurred in May, of Mr. H. F. C. Eggers, A.M.I.M.E., from injuries received in a motor car accident. Mr. Eggers was a partner in the firm of Haes and Eggers, Ltd., Sydney. On the death of Mr. Haes in 1909, Mr. Eggers took over the management of the business, and continued it until his death. Born in New Zealand, he graduated in civil engineering at the Dunedin University.

At Barrow Education Committee last week, the Mayor of Barrow referred in terms of very high praise to the services rendered to the Barrow Technical Schools by Mr. E. THORNTON, electrician, whose tragic death recently occurred.

NEW COMPANIES REGISTERED.

Arthur Ellis & Co., Ltd. (144,348).—This company was registered on July 14th, with a capital of £2,000 in £1 shares (1,000 pref.), to carry on the business of general, mechanical, and electrical engineers, manufacturers of and dealers in motor and other vehicles, aeroplanes, airships, motor cycles, boats, and conveyances of all kinds, makers of electric lamps and apparatus, garage keepers, carriers, coach builders, motor and tire manufacturers, electricians, &c. The preferred shares are entitled to a cumulative preferential dividend of 8 per cent. per annum, and to a further 40 per cent. of any surplus profits available for dividend after providing for 8 per cent. on the ordinary shares. The subscribers are: A. T. Ellis, Caxton House, Westminster, S.W., electrical and general engineer, 1 ord. share; W. L. Heald, Caxton House, Westminster, S.W., electrical and general engineer, 1 pref. share. Private company. The first directors (to number not less than two or more than five) are A. T. Ellis and W. L. Heald. Registered office: 201, Caxton House, Westminster.

Higgins & Griffiths, Ltd. (144,330).—This company was registered on July 12th, with a capital of £10,000 in £1 shares, to take over the business of electrical and general engineers carried on by A. Higgins and S. Griffiths at 21, Orchard Street, Portman Square, W., as Higgins and Griffiths. The subscribers (with one share each) are: A. Higgins, 21, Orchard Street, Portman Square, W., electrical engineer; S. Griffiths, 21, Orchard Street, Portman Square, W., electrical engineer. Private company. The number of directors is not to be less than two or more than five; the first are A. Higgins and S. Griffiths (both permanent, subject to holding 3,000 shares each). Remuneration as fixed by the company. Registered office: 21, Orchard Street, Portman Square, W.

British Italian Corporation, Ltd. (144,404).—Registered July 20th, by Herbert Smith, Goss, King & Gregory, 62, London Wall, E.C. Capital, £1,000,000 in 50,000 shares of £20 each. Objects: To carry on, subsidise, assist or participate in financial, commercial, industrial, manufacturing, electrical, railway, navigation, land development, mining, and other businesses, works, contracts, undertakings, and operations of all kinds in the British Empire, Italy, and elsewhere, to undertake any operations commonly carried out by financiers, company promoters, bankers, underwriters, concessionaires, contractors for public and other works, capitalists or merchants, to establish and carry on the business of a bank of deposit, to act as agents for the collection, receipt, transmission, or payment of money, &c. The signatories (with one share each) are: E. O. Goss, 62, London Wall, E.C., solicitor; F. H. King, 62, London Wall, E.C., solicitor; J. Sims, 121, Albert Palace Mansions S.W., solicitor; W. A. Bewes, 2, Harcourt Buildings, Temple, E.C., barrister; S. A. Sharpe, 205, Friern Road, Dulwich, S.E., accountant; E. J. Burrows, 29, Lyndhurst Road, Highams Park, Chingford, clerk; A. G. Mount, 22, Narford Road, Clapton, N.E., clerk. Minimum cash subscription, seven shares. The first directors (to number not less than three or more than nine) are Arthur Hill, 106, Eaton Square, S.W., bank director; Robert H. Benson, 31, Bishopsgate, E.C., merchant banker; J. W. Beaumont Pease, 13, Stratton Street, W., bank director; Sir Hy. Babington Smith, K.C.B., 121, St. James' Court, S.W.; Joseph Burn, 142, Holborn Bars, E.C., actuary; Alberto Pirelli, 144, Queen Victoria Street, E.C., company director; Ignatius G. Manzi-fe, 22, Abchurch Lane, E.C., manager of Credito Italiano; and Riccardo Bianchi, 22, Abchurch Lane, E.C., director of public companies. So long as the Credito Italiano holds at least £50,000 shares, it may nominate not more than one-third (or the number nearest to one-third) of the board. Remuneration in each year when the issued and paid-up capital is £1,000,000 or less, £300 each per annum and £700 extra for the chairman. In each year when the issued and paid-up capital exceeds £1,000,000, sums bearing the same proportion to the issued and paid-up capital as £300 and £700 respectively bear to £1,000,000. The directors may borrow or raise money for the purposes of the company, providing that the total amount outstanding at any one time (exclusive of moneys received from depositors or outstanding on bills or letters of credit or other instruments in the ordinary course of banking business) shall not, without the sanction of a general meeting, exceed twice the nominal amount of the issued capital. No notice of situation of registered office has yet been filed.

Birmingham Electrical Accessories Manufacturing Co., Ltd. (144,386).—This company was registered on July 19th, with a capital of £1,000 in £1 shares, to carry on the business of manufacturers of and dealers in electrical fittings and accessories, electrical, gas, hot water, and mechanical engineers, &c. The subscribers (with one share each) are: E. A. Welch, 49, Francis Road, Stechford, manufacturer; C. E. Garratt, 22, Thynne Street, West Bromwich, manufacturer. Private company. The first directors (to number not less than two or more than five) are G. Garratt, C. E. Garratt, E. A. Welch, and Alice Welch. E. A. Welch and C. E. Garratt are permanent. Qualification, 50 shares. Secretary: Amy M. Garratt. Registered office: Whitmore Street, Hockley, Birmingham.

British Electric Trading Co., Ltd. (9,641).—This company was registered in Edinburgh on July 17th, with a capital of £2,000 in £1 shares, to carry on the business of manufacturers of and dealers in all apparatus and articles connected with electricity. The subscribers (with one share each) are: W. J. Kerr, 26, Carlton Court, Glasgow, drysalter; R. M. Dunlop, 10, Brunswick Lane, Glasgow, secretary. Private company. The first directors (to number not less than three or more than seven) are not named. Qualification, £50 shares. Remuneration, £50 per annum. Solicitor: H. Hannah, Edinburgh.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Anchor Cable Co., Ltd. (69,073).—Capital, £250,000 in £10 shares. Return dated June 8th, 1916. 6,500 shares taken up; £61,000 paid on 6,100; £4,000 considered as paid on 400. Mortgages and charges: £50,000.

Anglo-American Telegraph Co., Ltd. (2,891c.).—Capital, £7,000,000 in £413,300 ord., £3,293,350 pref., and £3,293,350 def. ord. stock. Return dated May 19th, 1916. All stock taken up; £600,000 paid; £6,400,000 considered as paid. Mortgages and charges: Nil.

Carville Site & Power Co., Ltd.—Issue on July 7th, 1916, of £10,000 debs., part of a series of which particulars have already been filed.

Lamplough & Son, Ltd.—Mortgage dated June 23rd, 1916, created by the Receiver and Manager to secure not more than £2,500, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Messrs. Hoare, 37, Fleet Street, E.C.

Edison Accumulators, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated July 4th, 1916, to secure all moneys due or to become due from company to London County & Westminster Bank, Ltd., 41, Lothbury, E.C., not exceeding £15,000, in addition to a previous amount for not more than £5,000.

Bracuhy Falls & Metallurgical Syndicate, Ltd. (110,780).—Capital, £48,000 in £1 shares. Return dated December 30th, 1915 (filed June 5th, 1916). All shares taken up; 10s. 6d. per share called up; £25,200 paid. Mortgages and charges: Nil.

Anglo-Foreign Tramway Syndicate, Ltd. (112,859).—Capital, £10,000 in 9,500 pref. shares of £1 each, and 5,000 "A," 4,000 "B," and 1,000 ord. shares of 1s. each. Return dated December 31st, 1915 (filed May 25th, 1916). 4,200 pref., 370 "A," and 74 "B" shares taken up; £4,222 4s. paid. Mortgages and charges: Nil.

Geo. Bray & Co., Ltd. (76,185).—Capital, £160,000 in 80,000 pref. and 80,000 ord. shares of £1 each. Return dated June 6th, 1916. 55,000 pref. and 55,000 ord. shares taken up; £7 paid; £109,903 considered as paid. Mortgages and charges: £40,000.

Birkdale District Electric Supply Co., Ltd. (70,259).—Capital, £50,000 in £5 shares. Return dated May 10th, 1916. 9,200 shares taken up; £5 per share called up on 6,000, and £3 on 3,200; £39,600 paid. Mortgages and charges: £6,000 debs. issued as collateral security.

Brisbane Electric Tramways Investment Co., Ltd. (67,853).—Capital. £975,000 in 75,000 pref. and 120,000 ord. shares of £5 each. Return dated June 7th, 1916. All shares taken up; £5 per share called up on 30,024 ord.; £150,120 paid; £824,880 considered as paid on 75,000 pref. and 89,976 ord. Mortgages and charges: £450,000.

Harry W. Cox & Co., Ltd.—Particulars of £2,000 debentures, created June 28th, 1916, filed pursuant to Section 93 (3) of the Companies (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's property, present and future, including uncalled capital. No trustees.

Flather & Co., Ltd.—A memorandum of satisfaction in full on June 29th, 1916, of second mortgage debenture, dated May 23rd, 1905, securing £400, has been notified.

Coatbridge & Airdrie Electric Supply Co., Ltd. (89,178).—Capital, £1,000 in £1 shares. Return dated March 30th, 1916. All shares taken up; £1,000 considered as paid. Mortgages and charges: £161,812 8s. 11d.

British Insulated & Helsby Cables, Ltd. (52,285).—Capital, £1,000,000 in 100,000 pref. and 100,000 ord. shares of £5 each. Return dated April 10th, 1916. All shares taken up; £5 per share called up on 74,470 pref. and 40,065 ord.; £572,675 paid; £427,325 considered as paid on 25,530 pref. and 59,935 ord. Mortgages and charges: £700,000.

CITY NOTES.

Crompton and Co., Ltd.

MR. C. F. TUFNELL presided at the annual meeting, held on Monday at Salisbury House, E.C. He said that the trading for the last twelve months had been profitable. The year had been one of difficulty in many directions—the constantly increasing cost of material, the delays in delivery, the trouble of getting goods shipped, and the loss of further members of the staff, were a few of the obstacles with which they had had to contend. They had, however, managed to do a larger turnover during the year, and the gross profit was increased from £57,900 to £63,100, and, after deducting the various charges set forth in the accounts, they had at their disposal, with the carry-forward, £37,950, against £28,649 twelve months ago. They proposed to put £6,500 to the general reserve fund, as last year, and they suggested a larger sum as a special depreciation fund. In order to enable them the better to handle the orders with which they had been entrusted by the Government for the prosecution of the war, they had been obliged to purchase additional machine tools, and to make certain extensions to their premises. Not only had they had to pay war prices for these extensions and this new plant, but some of the expenditure would not be remunerative when the special war work on which they were engaged came to an end. In the circumstances, the board were of opinion that it was necessary to make a liberal reserve against this expenditure, and they had also to face the fact that in these strenuous times the ordinary rate of depreciation which they wrote off each year might not be sufficient, in some cases, to cover wear and tear. They next proposed to write off £1,600—the balance of preliminary expenses—so that this item would disappear from the balance sheet. They recommended the payment of the full dividend of 7 per cent. on the preference shares, but they felt compelled to again appeal to the patience of the ordinary shareholders. When addressing them last year, he referred to the need of husbanding their resources in these times of uncertainty and stress, and they had now to face war taxation on a scale which was altogether unforeseen twelve months ago. Although the carry-forward was increased from £7,691 to £10,479, this sum was subject to excess profit duty and assessment under the Ministry of Munitions Act, and this liability was in respect not only of the profits of the year under review, but applied to the previous year's profits also. They were quite unable to tell at the present moment what amount they would have to pay under these heads, but he might remind the shareholders that the basis of assessment for war taxes was the average profit of pre-war years, to which certain additions were made. They would remember that in the two or three years before the outbreak of war, in the old company's days, the business was not making profits, and, although the Acts allowed some relief in such cases, there was no doubt that if the reorganisation of the company had been carried out two or three years earlier they would have been entitled to retain more of their profits for the shareholders than they could hope for in the existing circumstances; but such was the fortune of war. The company's works were declared a controlled establishment in August of last year. During the year they had delivered a very large amount of war material, as well as equipment for Government and other munition works throughout the country, and the orders in hand for these various classes of work at the end of the year under review showed a considerable increase over the figure at which they stood twelve months previously. Having referred to the election of Mr. Britten, the manager at Chelmsford, to a seat on the board, the Chairman said that, as to the future, he was glad to say they had plenty of work in hand to keep them busy for many months to come, so they were not very much concerned for the current year as to their shops. What was to happen after the war was over was another matter. Some people anticipated considerable activity for a period, but they were taking steps to meet a possible set-back in the demand. He hoped the results of what they were doing would enable them to obtain business in other directions, as and when they required it, to compensate for any falling off in their ordinary trade, and this matter of the future was receiving their most careful attention. He would like once more to testify to the loyal manner in which they were being supported by the staff and others, from the managers downwards, and he would like to include their branch managers and representatives abroad. One and all were feeling the burden put upon them by the war and were striving their best in the interests of the shareholders.

Lieut.-Col. JOHN CLIBBORN seconded the motion.

Mr. DE UPPHAUGH, referring to the £10,000 put aside for excess profits, said that, as an ordinary shareholder, he had not received any dividend for ten years, and now, when there was a chance of getting a return on his money, it seemed as if the Government had stepped in and taken it. He thought it was an understood thing that the Government was going to allow investors a certain return on their capital before they annexed the excess profits.

Mr. HUSBAND said he thought the directors were to be congratulated upon the satisfactory way in which they had carried on the company during the past twelve months. It must have been a very anxious and troublous time, and that they had weathered the storm so well was distinctly a matter for satisfaction. He had intended to refer to the huge comparative reserves in the balance sheet, but after what the Chairman had said, he was satisfied that they were wanted for the purposes of the business. He was an old-fashioned financier, and he held that all reserves should be liquid, but he supposed that in the case of Crompton's that was a policy of perfection which it was not possible to adopt.

The CHAIRMAN, in reply, said that the matter of the excess profits tax was a very delicate one which they had better not discuss publicly. As to the large reserves, the special reserve of £10,000 was to cover the expenditure which they had incurred on plant and machinery which had been bought specially for Government work, and which would not be of any use after the war.

The report was adopted.

Edmundson's Electricity Corpn., Ltd.

The annual meeting was held on Thursday last week, at Salisbury House, E.C. Mr. P. D. TUCKETT, who was in the chair, said that the set-back in the steady progress which the company had been making year by year prior to the war, which was shown in the accounts, was directly and entirely attributable to the abnormal conditions resulting from the war. Almost all the undertakings had been adversely affected, the aggregate profits showing a reduction of over £12,000. Their costs had been increasing, while the lighting revenue had been shrinking, owing solely to the increased cost both of materials and labour, aggravated in some cases by the reduced efficiency resulting from the reduced loads. Coal, oil, copper, and all other materials used in the business had greatly risen in price. The increased cost of coal (often of inferior quality) accounted for a difference of near £13,000. Then, again, the unprecedented demand for labour, and particularly for skilled labour, coupled with the high cost of living, had necessitated the payment of higher wages, or of war bonuses, which was

the same thing in another form. They had continued the payment of war grants to the dependents of men on active service, such grants during the year absorbing nearly £3,000. What was, however, in some respects the most serious feature of the situation, so far as the staff was concerned, lay in the fact that they had been deprived of the services of many of their most experienced and highly-trained men at a time when they could least afford to lose them and were least able to replace them. Altogether, 364 men had left them to serve in the Army or Navy, and of these ten had laid down their lives. In order to cover, to some extent, the heavy extra expense incurred, they last year raised their rates of charge, and in view of the still heavier expense with which they were now faced they had had no alternative but to again increase them, in some cases up to their authorised maximum, and, indeed, in two or three cases they had been obliged to ask the Board of Trade to sanction an increase beyond the maximum. How far this would compensate them for increasing costs it was impossible to forecast, but it would fall considerably short of what was required to compensate them also for the loss of lighting revenue. They were, however, doing all they could to develop the power and heating loads, the importance of which they had long recognised, and so far as their limited opportunities admitted, he thought they were meeting with a very fair measure of success in this direction, for last year their power and heating connections aggregated the equivalent of 124,000 lamps, whilst for the first five months of the current year they represented the equivalent of 56,000 lamps. The revenue derived from this additional load had tended to minimise the loss of lighting revenue, but the shrinkage in the latter was so marked, and was likely to be so increasingly felt during the current year with the influence of the Summer Time Act super-added to those which were previously operating, that he felt it was useless to cherish any illusions that the new load would make good the loss on the old. Proceeding to refer to the accounts, he said the net balance of the profit and loss account was £13,259, about £10,000 less than last year. They had been able to pay the final half-year's dividend on the cumulative preference shares and carry forward £4,625. The general financial position of the company remained satisfactory; its cash resources amounting to nearly £36,000, as against £34,000 last year, and little more than £14,000 two years ago. The reserve stood at £73,148, or over £17,000 in excess of the figure last year. In view of the probability of a further shrinkage of profit during the current year, he thought they would have to withhold the payment of an interim dividend on the preference shares next January. It was most disappointing that the war should for the time being have largely deprived them of the fruits of their past labours, for he thought there was little doubt that, but for the war, they would to-day be paying a substantial dividend on the non-cumulative preference shares. They were not, however, alone in their sufferings, for all electric supply undertakings were suffering, and were likely to suffer increasingly, as long as the war lasted where no special condition existed to compensate them for their increased costs and reduced lighting revenue. Their lamp connections, amounting to an equivalent of 150,284 lamps, had been well maintained, but of these only 17 per cent. represented lighting, as compared with 32 per cent. for the previous year, and this tendency was still more marked in the connections for the first five months of the current year, the proportion of lighting to power having fallen to 10 per cent. It had been a feature of the war period that their power connections had been stimulated by the exceptional demands for power created by the war, and he hoped they might continue to derive a large part of the benefit from those connections after the war, although it was difficult to say at present how far many of them were likely to be permanent. Thus, at one place they had a single factory taking 600 KW., equivalent to over 18,000 lamps, for shell making. Dealing with the results of the subsidiary companies, he said the Isle of Wight Co. afforded as good an illustration as any of the way in which they had been adversely affected by the war, since it was that company which was chiefly responsible for the reduction in the dividend and interest item in the profit and loss account. Prior to the war, the company was progressing as steadily and satisfactorily as they could desire, its profits having increased by over £3,000 during the four years from 1909 to 1913, whereas for 1914 they declined by £1,456, and during the past year by a further £2,453. The two principal items accounting for this last reduction were an increase of £721 in the price of coal and a reduction of £2,241 in the lighting revenue. Last year Ventnor's lighting revenue shrank by as much as 31 per cent., and Sandown's by not much less. They had had very similar experiences at Lymington, Ilfracombe, Ramsgate, and Cromer, all holiday resorts deserted by their visitors. At Lymington the lighting revenue dropped 15 per cent. last year, at Ilfracombe 16 per cent., at Ramsgate 23 per cent., and at Cromer 29 per cent., following a drop of 10 per cent. in the previous year. Melton Mowbray's hunting season and Newmarket's racing and training activities had, of course, suffered owing to the war, and in both cases this had affected their dividends, and had consequently re-acted on them, whilst Bromley and Surbiton both suffered from the smaller consumption of their lighting consumers, Bromley's lighting revenue shrinking by £1,133, and Surbiton's by not much less. Finally, there was the Scarborough tramway undertaking, which, starting from a much less satisfactory point of departure, had suffered more seriously than any of the other undertakings in so far as its profit of £298 for 1914 had been converted into an actual loss of £1,722 for 1915. The bombardment by the German cruisers, followed by Zeppelin raids, besides reducing the resident population, was estimated to have deprived the town of nearly 500,000 of its summer visitors, on whom, to a very large extent, the earnings of the tramway necessarily depended, with the result that the revenue actually shrank by 58 per cent. as compared with 1914, and by 66 per cent. as compared with 1913. The undertaking presented one of the most difficult problems with which they had to deal, since it was obvious that they could not afford to run it indefinitely at a loss. On the other hand, it earned an aggregate gross profit of over £1,900 in the three years prior to the war, it gave promise of decided improvement during the first half of 1914, and they could not but hope that it might again show improving results after the war. For the time being, they were operating it with every possible economy, but, do what they would, they could not expect to avoid a substantial loss as long as they were confronted with the present conditions. There remained two developments of a much more satisfactory character. The Lancashire Power Co. increased its profits last year from £30,471 to £32,843, whilst for the current year, in spite of increased coal prices, it promised to do very substantially better still. It had not yet reached the stage at which it could prudently divide its profits, but if it continued to make the progress it was doing, he saw no reason why it should not be in a position to do so within two or three years. Consequently, it was a source of considerable satisfaction to them to feel that they were fully justified in supporting and saving their investment when, in 1908, they decided to take upon themselves the responsibility of increasing it by a further £28,000. The other satisfactory development related to the Surbiton undertaking, which had now been taken over from the Council. They were interested jointly with Callender's Cable and Construction Co., and the arrangement come to was similar to that made in the case of Frome. They took over the undertaking subject to the payment of the balance of the interest and sinking fund on the capital provided by the Surbiton Council, which in any case they were under an obligation to discharge, but, whereas previously they had no interest in the reversion, they now had the entire interest therein, and this should ensure their eventually making good, and, indeed, far more than making good, the losses incurred in the earlier years. In conclusion, he said that, as they would have gathered from his remarks, they were by no means sanguine as to their ability to avoid some further shrinkage of profit with the capital expenditure reduced to the barest minimum, and with costs tending to rise and lighting revenue to decline still further. They were doing what they could to minimise the consequences of these conditions; but the conditions were such that they could not hope entirely to overcome them, and he was afraid they had got to recognise the fact and accept the sacrifice which the exigencies of the time might require them to make. Their present position and prospects were wholly due to war conditions, and should, therefore, rapidly improve as the country resumed its normal way of life after the war. In the meantime, it should prove reassuring to them to remember that the gross profits of the various undertakings increased by approximately £60,000 between 1908 and 1914, or at an average rate of nearly £9,000 per annum, whilst for this past year the subsidiary companies, in addition to providing for the depreciation of their free wiring and wiring stocks, had appropriated to reserve and carry-forward over £40,000 in excess of the amounts provided in 1908. It was this policy, which they had steadily pursued, of building up the resources of the subsidiary companies which would prove their salvation in this time of stress, and would, he hoped, enable them, a year or two hence, to proceed once more on that path of steady progress which for the time being had been so rudely interrupted. And, after all, however disappointing it might be, and however they might deplore it, this temporary loss of profit was a comparatively small matter when they considered the overwhelming issues at stake and the supreme sacrifices which were being made to remove once for all the intolerable menace which had been threatening Europe with increasing imminence for so many years.

Mr. A. A. Campbell Swinton seconded the motion, which was adopted without discussion.

French Lighting and Tramway Undertakings.

The accompanying tables show the financial results realised by a number of electric lighting and tramway companies in France during the past two years. In the case of the two supply companies for which no rate of dividend on the ordinary shares is mentioned for 1914, no information is available for the moment, and it must therefore not be assumed that a distribution did not take place for that year. The absence of any dividend declaration by certain other companies in both years is due chiefly to the allocation of net profits to contingency funds in consequence of the effects of the war. The list of tramways also comprises the Compagnie Générale des Omnibus, whose rate of distribution for 1914 is also lacking. The inclusion of this Paris company is explained by the fact that it owns an extensive mileage of trolley and conduit lines in Paris, whilst the company's motor omnibus services, although resumed to a slight extent in June of the present year, were entirely at a

standstill in 1915 owing to the requisition of the 'buses by the Army authorities. The tables are as follows:—

Lighting and Power Companies.

	Dividend per cent. on ord. shares. 1915.	1914.
Compagnie Parisienne de Distribution d'Electricité	4	4
Société d'Electricité de Paris	8	8
Parisienne Electrique	—	—
Compagnie Générale de Distribution d'Energie Electrique	—	—
Energie Electrique du Littoral Méditerranéan	4	3
Compagnie Centrale d'Energie Electrique	—	—
Energie Industrielle	—	—
Forces Motrices et Eclairage de Grenoble	—	—
Force Motrice de l'Arve	7	—
Compagnie Centrale d'Energie Electrique	—	—
Forces Motrices du Rhone	4.2	3.15
Havraise d'Energie Electrique	5.6	5.6
Hydro-Electrique de Fure et Morce ...	—	—
Société Biterroise de Force et Lumière ...	5	—
Tramway Undertakings.		
Compagnie Générale des Omnibus de Paris	5	—
Société Parisienne pour l'Industrie des Chemins de Fer et des Tramways Electriques	—	—
Compagnie des Tramways de l'Est Parisien	—	—
Compagnie Générale de Tramways ...	5	4
Tramways de le Rive Gauche	—	—
Tramways Algeriens	3.6	3.2

Yorkshire Electric Power Co.

The directors report continued satisfactory progress. Revenue from sale of electricity increased, and notwithstanding the very high costs of coal and labour the net profits, after payment of bank and other interest, also increased. The net profits for the three half-yearly periods ended June 30th have been:—1916, £13,550; 1915, £9,873; 1914, £10,414. The dividend on the 6 per cent. cumulative preference shares for the half-year, absorbing £4,787, will be paid August 1st. In view of the financial conditions arising out of the war and the heavy commitments which the company has had to incur, due to the demands for munitions, the directors have deferred the consideration of a dividend on the ordinary shares until the end of the year. An important extension of the Thornhill power station is being made in consequence of the demands from the company for additional supply, and as a first instalment a 6,000-kw. turbo-alternator will shortly be erected.

County of Dorset Electric Supply Co., Ltd.

The report for 1915 shows that the capital expended in the associated companies to date amounts to £34,451. The revenue receipts, exclusive of the Lyme Regis dividend, amount to £2,461, against £1,062 last year. The gross profit, including the dividend of the Lyme Regis Co., amounts to £1,271. Against this must be placed interest on temporary loans £846, leaving a profit on the year's operations of £425, against a deficit of £160 in 1914. The subsidiary companies (Lyme Regis, Blandford Forum & District, and Swanage Companies) have each shown satisfactory progress. The Lyme Regis Co., in spite of lighting restrictions, shows a substantial profit on the year's working, equivalent to a dividend of 8 per cent. The number of consumers on December 31st was 112 in Dorchester, 64 in Blandford, 133 in Lyme Regis, and 86 in Swanage. Progress during the year has been steady and satisfactory, especially considering the adverse conditions due to the war.

Standard Waygood Co., Ltd. (Australia).—The report of this company for the year ended March 31st, after writing off £9,286 for bad and doubtful debts and depreciation of securities, shows a loss of £1,165. With £17,802 brought forward there was an available balance of £16,638. An interim dividend of 1s. per share on the fully paid-up shares and 6d. per share on contributing shares absorbed £7,819, and the directors recommend a final dividend of like amount, making 10 per cent. for the year, leaving £1,000 to be carried forward as provision for income-taxes. The report states that a plant designed and used for the manufacture of electric searchlight carbons has been of service in developing an industry new to Australia, and useful to the defence forces. The cost and the loss on the manufacture of carbons has been entirely written off. Work in progress brought forward from the previous year was expected to show good profits, but increased cost of labour and material swallowed up these margins, and left losses, some very large. Orders are extremely scarce, and no interim dividend will be paid.—*Sydney Morning Herald.*

Mather & Platt, Ltd.—Interim dividend on the ordinary shares of 5 per cent., less income-tax, for the half-year to June 30th, being at the rate of 10 per cent. per annum.

Copper Prices.—F. Smith & Co. and James & Shakespeare report, July 26th.—No changes in prices quoted last week.

Companies to be Struck Off the Register.—Unless cause to the contrary is shown within three months, the following companies will be struck off and dissolved:—

Anglo-German Wireless Syndicate.
Atkins Filter, Engineering & Water Softening Co.
Bevan Lock-Nut Co.
Blanchard Lamp Foreign Patents Co.
Bridlington Electrical Engineering Co.
Helis Cell & Accumulator Co.
Improved Railway Signals.
International Filaments.
New Century Arc Light Co.
Paris Accumulator Co.
Power Transmission Syndicate.
Smoke Consumption (Cowper-Coles Patents).
United Electric Light & Power Supply Co.
Warner Engineering Co.

Tubes, Ltd.—A further interim dividend of 15 per cent., free of tax, making 20 per cent., free of tax, for the year ended April 30th last. It is intended to increase the capital of the company by a further 50,000 shares of £1 each.

Veritys, Ltd.—The separate meetings of the holders of the ordinary and management shares held, by order of the High Court, on July 25th, according to the *Financial Times*, considered a scheme of arrangement which provides that—

1. The 6,980 £10 ordinary shares shall be called preferred ordinary shares, and as from January 30th, 1916, have the right to a cumulative dividend of 7 per cent. and rank both as regard capital and dividend in priority to the management shares, but after the 5 per cent. and 6 per cent. cumulative preference shares, without further participation; and
2. The 200 £1 management shares shall be called deferred ordinary shares, and as from January 30th, 1916, and subject to the provision for a reserve fund and to the rights of the preferred ordinary shares, shall confer the right to the surplus profits which it may be determined to distribute.

Southern Brazil Electric Co., Ltd.—Mr. E. H. Tootal presided at the annual meeting, on 19th inst., and said that steady progress was being made with their different undertakings, and there was every reason to look for a satisfactory increase of revenue all round, but as the present stage was largely one of development and extension it would be some time before that increase could attain the full anticipated proportions. The Piracicaba tramways was opened for traffic, and it would soon show material development of passenger and goods traffic. Work was also progressing well with the electrification of the Campinas steam tramway, though unfavourable weather and the difficulty of obtaining material caused delay.

Wm. Beardmore & Co., Ltd.—After providing for depreciation, debenture interest, contingencies, excess profits, paying the preference dividend, and putting £50,000 to special preference dividend reserve, 6 per cent., free of tax, is to be paid on the ordinary shares, carrying forward £195,288.

Underground Electric Railways Co., of London.—Interest on the 6 per cent. first cumulative income debenture stock for the half-year ended June 30th at the rate of 6 per cent. per annum, less tax, and on the 6 per cent. income bonds of 1948 for the half-year ended June 30th at the rate of 6 per cent. per annum, free of British income-tax.

Central London Railway Co.—Interim dividends for the past half year on the undivided ordinary stock at the rate of 3½ per cent. per annum, and on the preferred ordinary stock at the rate of 4 per cent. per annum.

City & South London Railway Co.—Interim dividends for the past half-year on the whole of the outstanding 5 per cent. preference stocks 1891, 1896, 1901 and 1903 at the rate of 5 per cent. per annum, and on the ordinary stock at the rate of 1½ per cent. per annum.

Metropolitan District Railway Co.—Interim dividends for the past half-year on the 4 per cent. guaranteed stock at the rate of £4 per cent. per annum, on the first preference stock at the rate of £4 10s. per cent. per annum, and on the second preference stock at the rate of £3 per cent. per annum.

London Electric Railway Co.—Interim dividend for the past half-year on the 4 per cent. preference stock at the rate of £4 per cent. per annum, and on the ordinary shares at the rate of £1½ per cent. per annum.

W. & T. Avery, Ltd.—Dividend of 10 per cent., making 12½ per cent. for the year. Scarcity of clerical labour and other circumstances have delayed the preparation of the balance sheet and the holding of the annual meeting for the present.

Newcastle-upon-Tyne Electric Supply Co.—The "Financial Times" states that it has been decided to postpone the payment of the preference dividend until about the end of September.

Chatham & District Light Railways Co.—Interim dividend at the rate of 3 per cent., less tax, for the past half-year.

Bournemouth & Poole Electricity Supply Co., Ltd.—Interim dividend on the ordinary shares at the rate of 5 per cent. per annum, less tax, for the past half-year.

County of London Electric Supply Co., Ltd.—Interim dividend on the ordinary shares at the rate of 5 per cent. per annum, less tax, for the half-year ended June.

Credenda Conduits, Ltd.—After writing £2,000 off goodwill, and paying 8 per cent. per annum dividend, tax free, £955 is to be carried forward.

London Electric Supply Corporation, Ltd.—Interim dividend of 5 per cent. on the ordinary shares.

Kaministiquia Power Co.—Dividend at the rate of 7 per cent. per annum for the past quarter.

Lanarkshire Tramways Co., Ltd.—Interim dividend, 6½ per cent. per annum, less tax, for the past half-year.

Hong-Kong Tramway Co., Ltd.—Interim dividend, 7 per cent., less tax.

Metropolitan Electric Supply Co., Ltd.—Interim dividend on ordinary shares, 1s. per share for the past half-year.

City of Buenos Ayres Tramways Co. (1904), Ltd.—A dividend of 1s. 3d. per share (at the rate of 5 per cent. per annum), less income-tax, is announced for the past three months.

STOCKS AND SHARES.

Tuesday Evening.

Stock Exchange markets have recovered to a great extent from the depression into which they were plunged by the raising of the Bank Rate to 6 per cent. The tardy explanation of the way in which the country's daily expenditure of six million pounds on the war was arrived at helped to promote a better feeling, and it was considered a little unfortunate that explanation at greater length was not afforded by Mr. McKenna at the time that he made his statement.

Money continues to pile up from profits and savings, and has to be used in one direction or another. Treasury Bills and Exchequer Bonds are splendid investments; but capitalists do not care to put all their money into such securities, and the consequence is that the money is overflowing into other departments. The raising of the Bank Rate to 7 per cent. was feared at one time; but even if it were advanced to this level, the root factor would not be destroyed—that there is plenty of money seeking a more permanent investment than any short-term borrowings offer.

Home Railway stocks have recovered, after being dull and heavy. The factor outlined in the preceding paragraph becomes daily more obvious; and the first of the half-yearly dividends from the Home Railway companies are sufficiently good to stimulate buying of the stocks.

The Underground group entered the field early with its dividend declarations. It may be well to recall that the present occasion is the first that the profits are divided under the arrangements made by the recent shuffling of the cards in this group. The various companies pay their receipts into a single account or pool, from which it is shared out again in fixed proportions.

The City & South London Railway takes 6 per cent. from this pool, which is three times as much as its previous share; and no doubt this enables the company to pay a dividend at the rate of 1½ per cent. on its ordinary stock, against nothing at all since the first half of 1913, when the shareholders got ½ per cent. The London Electric Railways takes 30 per cent. of the joint earnings, instead of 26 per cent. as previously, and the dividend on its ordinary shares goes up from 1 per cent. to 1½ per cent. No change was made in the proportions of the Central London or the District Companies, and the undivided ordinary stock of the former is to receive 3¼ per cent., giving the preferred ordinary 4 per cent.; while District pays 3 per cent. on its 5 per cent. second preference stock, the same as it did a year ago.

The London General Omnibus dividend is reduced to 5 per cent., free of tax, which is 1 per cent. less—due to the company's getting 32 per cent., instead of 40 per cent., of the fund already referred to. Obviously, the Tube companies have benefited at the expense of the London General Omnibus Co.

So far as prices are concerned, these dividend declarations have had little effect. The quotations are firmer, and Underground electric incomes have recovered most of their 3¼ points drop of last week. It is announced that the company will pay its coupon of 3 per cent., free of tax, on September 1st. Most of the Steam stocks are better, those in the Southern passenger group improving from a revival of the 35-year-old scheme for a Channel tunnel. The idea of such a tunnel is, of course, much older than this; but the company now in existence for the purpose of constructing a tube between this country and France came into being in 1881, under a title slightly different from the present one.

County of London ordinary and preference shares are both up ⅛ on the declaration of an interim dividend at the rate of 5 per cent. on the former, this being the same as a year ago, and regarded, therefore, as distinctly satisfactory. City Lights and Charing Cross preference hold their previous improvements. A rise of 1/16 in London Electrics has taken the price to 1 5/16. No further changes have occurred in the list. There is still, however, a quiet demand for shares, and very little supply to meet it. Electric Constructions are better at 16s. 6d. British Westinghouse preference maintain their substantial improvement, and during the past few days have been up to 52s. 6d., which price tempted a few sellers, with the result that, on balance, there is no quotable change in the shares at 51s. 6d.

The Telegraph market has halted in its upward march, and the high prices have brought a little stock to market. The only change in quotations, however, is a fall of ⅛ in Globe Telegraph & Trust preference. The rest of the list exhibits sufficient strength for the market to absorb with ease the shares that are offered. United River Plate Telephones reacted to 6¾, but Chili Telephones remain good at 7.

Marconis took a turn for the better; the price touched 3¼ bid, but eased off a trifle to 3 7/32. The subsidiaries, however, have improved, Americans hardening to 18s. and Canadians to 11s., while there has been a little business this week in Spanish and Generals on the basis of 10s. 6d. The Government is bidding 99¾ for New York Telephone bonds or 103¾ for the dollar bonds. Of the cable companies' shares, British Insulated at 11¾ continue to advance, and are ½ up on the week. Cromptons keep about 10s., the meeting held early this week having no effect upon the price.

Brazil Tractions are ex 1 per cent. dividend, equal to ¾ per cent. net, so that at 62 ex dividend the price is actually ¾ higher. Anglo-Argentine second preference eased off to 3⅛. The British Columbia Electric group is firmer, the preferred and the deferred stocks both hardening. Mexico Tramways 5 per cent. first mortgage bonds are 1 lower at 41, although the news from Mexico seems to wear a somewhat brighter complexion.

The rubber market is quiet and disposed to droop, in consequence of the fall to 2s. 2d. per lb. in the price of the raw material. From this there was a small recovery, but the dwindling in rubber has checked the volume of buying. Armament shares are better, and there is a brisk demand for nearly all the companies connected with the iron, coal and steel industries. Copper shares remain heavy, for want of a recovery in the price of the metal itself.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1914.	Dividend 1915.	Price July 25, 1916.	Rise or fall this week.	Yield p.c.
Home Electricity Companies.					
Brompton Ordinary	10	10	6⅜	—	£7 18 2
Charing Cross Ordinary	5	5	8¼	—	6 18 0
do. do. do. 4½ Pref.	4½	4½	8¼	—	6 8 7
Chelsea	5	4	8	—	6 18 4
City of London	9	8	12⅞	—	6 8 0
do. do. 6 per cent. Pref.	6	6	10⅝	—	5 14 3
County of London	7	7	10⅞	+ ⅛	6 10 0
do. 6 per cent. Pref.	6	6	10⅝	+ ⅛	5 14 3
Kensington Ordinary	9	7	6⅝	—	6 16 7
London Electric	4	3	1 7/16	+ 1/16	6 17 2
do. do. 6 per cent. Pref.	6	6	4½	—	6 13 4
Metropolitan	3½	3	3⅜	—	6 6 4
do. 4½ per cent. Pref.	4½	4½	8	—	7 10 0
St. James' and Pall Mall	10	8	6	—	6 13 4
South London	6	6	2½	—	8 13 10
South Metropolitan Pref.	7	7	1½	—	6 4 6
Westminster Ordinary	9	7	6½	—	5 14 3
Telegraphs and Telephones.					
Anglo-Am. Tel. Pref.	6	6	104	—	5 15 —
do. Def.	30/-	33/6	23	—	7 10 9
Chile Telephone	8	8	7	—	5 14 5
Cuba Sub. Ord.	5	5	7½	—	6 13 4
Eastern Extension	7	8	1 1/16xd	—	*5 7 8
Eastern Tel. Ord.	7	8	149xd	—	*5 7 8
Globe Tel. and T. Ord.	6	7	121xd	—	*5 8 8
do. Pref.	6	6	10½xd	— ⅛	5 10 4
Great Northern Tel.	22	22	38	—	5 18 0
Indo-European	13	13	48	—	6 12 8
Marconi	10	10	3 3/32	+ 3/32	3 2 0
New York Tel. 4½	4½	4½	99¾	—	4 10 3
Oriental Telephone Ord.	10	10	2	—	5 0 0
United R. Plate Tel.	8	8	6¾	— 1/16	*5 18 5
West India and Pan.	1	—	1½	—	— —
Western Telegraph	7	8	15 xd	—	*5 6 8
Home Rails.					
Central London, Ord. Assented	4	4	74	+ 1	5 8 1
Metropolitan	1½	1	26½	+ ½	3 15 6
do. District	Nil	Nil	19½	+ ¼	Nil
Underground Electric Ordinary	Nil	Nil	2	+ 1/16	Nil
do. do. "A"	Nil	Nil	6,6	+3d.	Nil
do. do. Income	6	6	91	+8	*6 11 10
Foreign Trams, &c.					
Adelaide Sup. 6 per cent. Pref.	6	6	5	—	6 0 0
Anglo-Arg. Trams, First Pref.	5½	5½	3¾	—	7 2 0
do. 2nd Pref.	5½	5½	3½	— ⅛	8 16 0
do. 5 Deb.	5	5	77⅞	—	6 9 0
Brazil Tractions	4	4	62xd	+ ¾	6 9 0
Bombay Electric Pref.	6	6	104	—	5 14 3
British Columbia Elec. Rly. Pfce.	5	5	60xd	—	8 6 8
do. do. Preferred	—	Nil	41½	+1½	Nil
do. do. Deferred	—	Nil	40	+1	Nil
do. do. Deb.	4½	4½	65	—	6 10 9
Mexico Trams 5 per cent. Bonds	—	Nil	41	—1	Nil
do. 6 per cent. Bonds	—	Nil	34	—	Nil
Mexican Light Common	Nil	Nil	20	—	Nil
do. Pref.	Nil	Nil	88	—	Nil
do. 1st Bonds	Nil	Nil	43	—	—
Manufacturing Companies.					
Babcock & Wilcox	14	15	9	—	5 0 0
British Aluminium Ord.	5	7	26/-	—	5 7 8
British Insulated Ord.	15	17½	11¾	+ ¼	7 9 0
British Westinghouse Pref.	7½	7½	51/6	—	5 16 8
Callenders	15	20	12½	—	8 0 0
do. 5 Pref.	5	5	4½	—	5 11 1
Castner-Kellner	20	—	8⅜	—	5 6 8
Edison & Swan, £3 paid	Nil	—	9/6	—	Nil
do. do. fully paid	Nil	—	1¾	—	Nil
do. do. 5 per cent. Deb.	5	5	57	—	8 15 8
Electric Construction	6	7½	16/6	+3d.	9 1 10
Gen. Elec. Pref.	6	6	10	—	6 0 0
Henley	20	25	15½	—	8 1 3
do. 4½ Pref.	4½	4½	4	—	5 12 6
India-Rubber	10	10	12½	—	*8 3 4
Telegraph Con.	20	20	89xd	—	*8 4 9

* Dividends paid free of income-tax.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING JUNE, 1916

THE June returns of electrical business show considerably increased values, both in the export and import sections, as compared with the previous month, which was itself considerably above the average as regards business.

Thus the exports for June reached a total value of £603,510, as compared with £499,384 in May and £353,266 in April. This excellent showing is largely accounted for by submarine cable exports to Canada (£96,000) and Brazil (£17,500), although machinery, cable, and lamp exports, amongst others, reached higher values than in May, while telephonic and battery exports fell off in value.

The imports for the month were valued at £316,697, as compared with £302,583 in May; a considerable decrease occurred in telegraphic and telephonic imports, but in other directions increased values obtained.

The re-exports at £22,604 showed a slight increase on the previous month's total.

Canada takes precedence as our best customer during the month, but business was good in many directions, including India and the various Colonies, while nearer to home France, Russia, and Norway were excellent customers.

As regards the importers into this country, the United States did a considerably increased business, while from Holland we purchased some £26,000 worth of lamps.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.

Destination of exports and country consigning imports.	Electrical goods and appliances.	Wires and cables, rubber and other insulations.	Electric lighting fittings and accessories.	Electric glow lamps.	Electric arc lamps and lamp parts.	Electric meters and instruments.	Electric machinery.	Electrically-driven machinery.	Batteries and accumulators.	Carbons.	Telephonic cable and apparatus and electric bells.	Telegraphic cable and apparatus.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	1,855	12,709	347	3,052	5,129	1,195	17,253	751	309	221	641	8,242	51,704
German West Africa	...	...	...	...	...	...	...	...	59	...	...	...	59
Netherlands, Java and Dutch Indies ...	2 171	22,030	1,052	37	...	15	1,891	488	157	8	1,789	2,055	31,693
Belgian Congo	17	...	36	...	...	...	...	...	...	...	51	...	104
France	2,905	1,317	505	27	62	53	24,708	14,130	1,228	146	3,250	9,557	57,888
Portugal	135	834	...	8	...	236	545	705	...	...	1,033	880	4,376
Spain, Canary Isles and Spanish N. Africa...	472	98	170	277	...	5,354	9,015	102	920	35	13	328	16,784
Switzerland, Italy and Austria-Hungary ...	223	112	121	...	...	538	565	235	...	261	297	93	2,445
Channel Isles, Gibraltar, Malta and Cyprus...	174	299	15	104	...	34	...	...	44	...	28	224	922
U.S.A., Philippines and Cuba	3,901	...	249	63	...	34	219	133	159	...	190	815	5,763
Canada and Newfoundland	366	29	16	183	...	485	5,187	...	398	10	...	102,621	109,195
British West Indies and British Guiana ...	44	...	16	49	...	...	148	...	...	...	95	185	537
Mexico and Central America	54	1,263	...	18	...	...	414	...	...	...	...	...	1,749
Peru and Uruguay	10	...	...	50	...	845	42	290	163	...	8	73	1,481
Chile	175	259	486	292	...	70	873	...	174	50	62	171	2,612
Brazil	161	560	17	178	...	252	1,092	33	1,690	48	...	17,559	21,590
Argentina	2,176	8,303	1,172	1,149	340	1,975	12,737	1,025	1,372	13	982	4,659	35,905
Colombia, Venezuela, Ecuador and Bolivia...	71	737	...	...	...	...	20	...	101	77	75	...	1,081
Egypt, Tunis and Morocco	335	883	138	483	...	127	786	14	16	16	506	7,608	10,912
British West Africa	131	165	17	15	...	...	1,163	4	15	...	27	137	1,674
Rhodesia, O.R.C. and Transvaal	1,131	1,898	172	566	...	902	1,721	578	48	69	6	15	706
Cape of Good Hope	1,044	5,907	397	1,071	...	307	1,023	44	559	...	...	...	10,352
Natal	314	9,175	218	169	...	713	1,969	...	331	8	11	289	13,197
Zanzibar, Brit. E. Africa, Mauritius & Aden	39	111	30	84	...	...	100	...	...	16	...	...	380
Azores, Madeira and Portuguese Africa ...	...	49	...	75	...	60	...	...	...	...	...	73	257
French African Colonies and Madagascar...	...	...	...	24	...	...	316	...	...	...	...	...	340
Persia	25	817	...	...	...	...	131	839	100	...	2	58	1,972
China and Siam	630	5,189	710	685	...	1,018	7,208	1,422	296	20	345	577	18,100
Japan and Korea	28	113	...	...	...	28	252	31	1,647	...	...	150	2,249
India	4,181	36 522	3,479	3,471	...	2,898	17,954	1,472	3,734	126	1,247	403	75,487
Ceylon	97	124	208	187	...	19	518	82	...	14	20	353	1.622
Straits Settlements, Fed. Malay States and Sarawak	568	5,756	98	298	...	1,022	1,897	290	242	167	650	1,326	12,314
Hong Kong	76	1,640	113	174	...	1,783	48	...	43	20	34	557	4,488
West Australia	117	4,939	126	179	...	360	842	344	361	8	...	...	7,276
South Australia	...	2,702	46	214	...	46	539	...	25	47	...	115	3,734
Victoria	899	16,973	936	1,637	23	1,094	10,664	...	411	...	747	67	33,451
New South Wales	728	16,606	195	1,635	...	890	4,055	624	1,046	292	3,130	934	30,135
Queensland	148	241	104	...	...	10	85	153	3,892	...	278	348	5,259
Tasmania	29	46	...	43	...	...	188	...	141	...	...	...	447
New Zealand and Fiji Islands	1,471	4,058	920	1,570	...	627	4,632	42	758	4	2,615	75	16,772
Total, £	26,901	162,464	12,109	18,067	5,554	22,990	130,800	23,828	20,439	1,679	18,132	160,547	503,510

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

Russia, Norway, Sweden and Denmark ...	200	...	...	...	1,073	...	4,742	1,053	793	75	2,789	10,725
Germany	...	...	...	...	...	...	...	...	...	...	...	...
Holland...	...	1,127	161	18,534	7,776	...	322	13	...	...	...	27,933
France	262	...	100	100	406	907	1,374	...	8,014	2,114	274	13,551
Switzerland	1,045	22	328	225	...	1,517	155	...	...	680	...	3,972
Italy	140	6,719	...	...	...	...	800	...	...	...	...	7,659
United States	13,008	7,813	4,740	5,819	6,481	932	24,568	125,874	3,718	5,854	46,815	245,622
Total, £	14,655	15,681	5,329	24,678	15,736	3,356	31,961	126,940	12,525	8,723	49,878	309,462

Additional imports.—Spain, batteries, £2,500, carbons, £332; Japan, goods, £118, fittings, £1,436, glow lamps, £593, arc lamps, £351, batteries, £8; Canada, goods, £958, arc lamps, £157, machinery, £780, electrically-driven machinery, £2.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

Various countries, mainly as above ...	1,547	3,765	...	1,530	...	372	4,860	...	930	969	8,431	22,604

TOTAL EXPORTS: £603,510 TOTAL RE-EXPORTS: £22,604 TOTAL IMPORTS: £316,697

NOTE.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns. Imports are credited to the country whence consigned, which is not necessarily the country of origin.

EXTENSIONS AT THE SIMMER PAN STATION OF THE VICTORIA FALLS AND TRANSVAAL POWER CO.

By R. TURNBULL MAWDESLEY.

The writer is enabled, through the courtesy of Mr. Bernard Price, the chief engineer of the Victoria Falls and Transvaal Power Co., to give a brief description of the extensions to that company's generating plant, which extensions have been rendered necessary by the rapidly increasing demand for power on the Rand.

It will be remembered that an exhaustive description of the Victoria Falls and Transvaal Power Co.'s system has already appeared in these columns,* and these notes are confined principally to extensions at the Simmer Pan station, though, as will be noted, other extensions have taken place at Brakpan and at Rosherville.

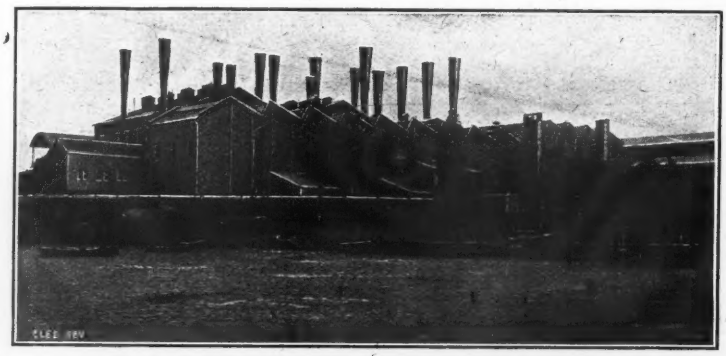


Fig. 1.—Simmer Pan Power Station, showing Boiler House Extensions.

The generating plant at Simmer Pan comprised six 4,000-K.V.A. turbo-alternators, and fig. 3 shows one of two additional turbines in course of erection. Both of these, together with the new boiler plant, were put in operation early last year. Each of these generators is of 11,000 KW. (15,700 K.V.A.) capacity, the alternators being of the totally-enclosed type.

There are three single-phase transformers operating in conjunction with each of the above alternators (one in each phase), and stepping up from 5,000 volts to either 42,000 or 10,500 volts. These transformers were made by the American General Electric Co. in Schenectady, and are of the oil-insulated water-cooled type, contained in circular cases, with the H.T. leads entering the top. The existing boiler-house at Simmer Pan was enlarged, and eight Babcock & Wilcox standard and marine type boilers, with chain-grate stokers of their latest design, were added. Each of these boilers is of 33,000—38,000 lb. per hour rated capacity, with internal superheaters.

Fig. 1 shows a comprehensive view of the Simmer Pan station, with boiler-house extension. The lake in the foreground is, it is understood, used only for circulating water, and not for boiler feed.

Regarding extensions at the company's other stations, it may be mentioned that last summer the work of installing at the Brakpan station two further three-phase turbo-alternators, each of 12,000 KW. capacity, and 10 boilers similar to those already put into commission at Simmer Pan, was completed, and the plant was brought into use.

At Rosherville eight boilers of 33,000 lb. capacity were installed, and three further turbo air compressors, each of about 10,000 H.P. capacity.

Fig. 2 shows an existing 10,000-KW. turbo-alternator, with part of the station control-board at Rosherville power station.

Under normal conditions, the four stations (*i.e.*, Vereeniging, Brakpan, Simmer Pan and Rosherville) are operated in parallel, and the average load during the heaviest hour of an average day now reaches 100,000 KW. This should not be confounded with the peak loads, which may be considerably higher.

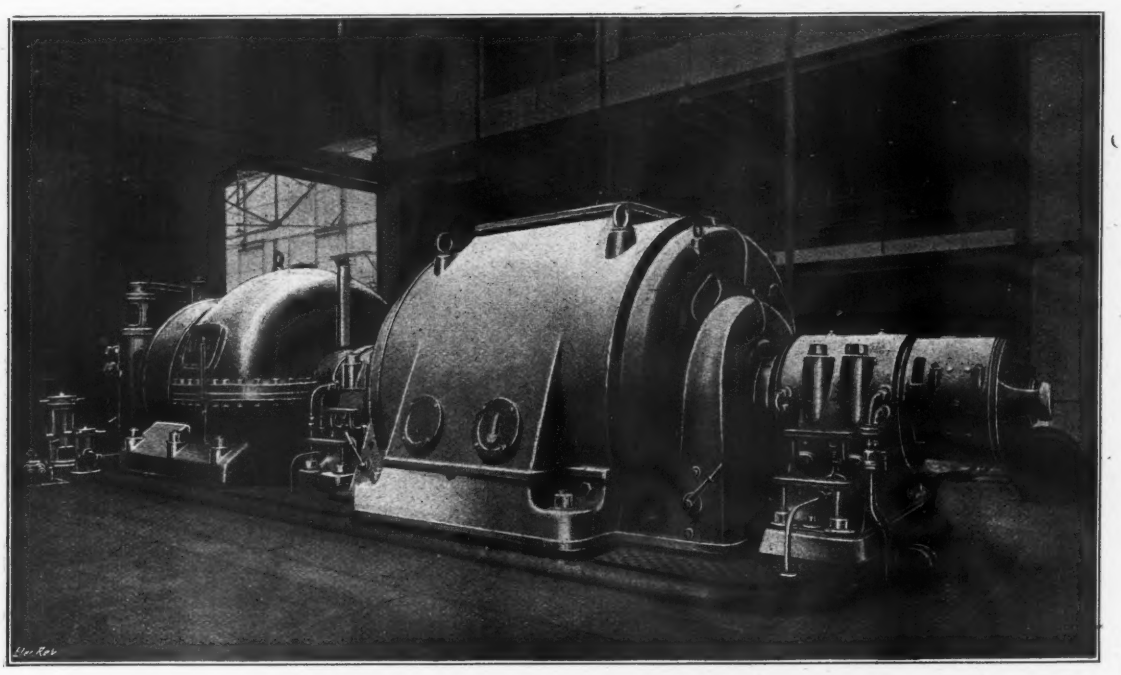


Fig. 2.—10,000-KW. Turbo-Alternator, Rosherville Power Station.

The total generating capacity of the four power stations is now more than 137,000 KW. The present business (inclusive of the supply of compressed air) closely approaches 600,000,000 units sold per annum, and the extensions of plant will enable this figure to be considerably increased in the near future.

* A paper read by the company's managing director, Mr. A. E. Hadley; Elec. Rev., March 28th, 1913.

THE UTILISATION OF WASTE HEAT FOR AGRICULTURE.

THE following letter appeared in *Nature* last week:—

In the cheap generation of electricity the great problem must be how to secure and utilise by-products. With steam-driven stations the chief by-product is an abundant supply of hot water from the condensers, which in this country is looked upon as a nuisance to be got rid of as easily as possible. Would it not be possible to make use of this low-grade heat for agricultural purposes, so supplementing our all too scanty summers?

Power-houses burning 1,000 tons of coal and upwards per week are quite common, and something like half of the heat generated by the coal is absorbed by the condensing water. It might be possible to heat fields by running the warm water through ditches, or perhaps better results would be obtained by running it through pipes buried in the ground. By this means large areas of land might be stimulated to produce much greater crops than have hitherto been found possible. It may be urged that the majority of existing power-houses are not in agricultural districts, so that the proposed experiment is not possible except in a few cases. To this one may reply that, in the near future, many large stations will be put down to supply current in bulk to vast areas. With the high voltage used for them the location of the power-house becomes a matter of wide choice, and it would be possible to put them in agricultural districts if this should prove financially worth while. The views of readers of *Nature* on this point would be of interest.

C. TURNBULL.

Electricity Works, Tynemouth, June 29th.

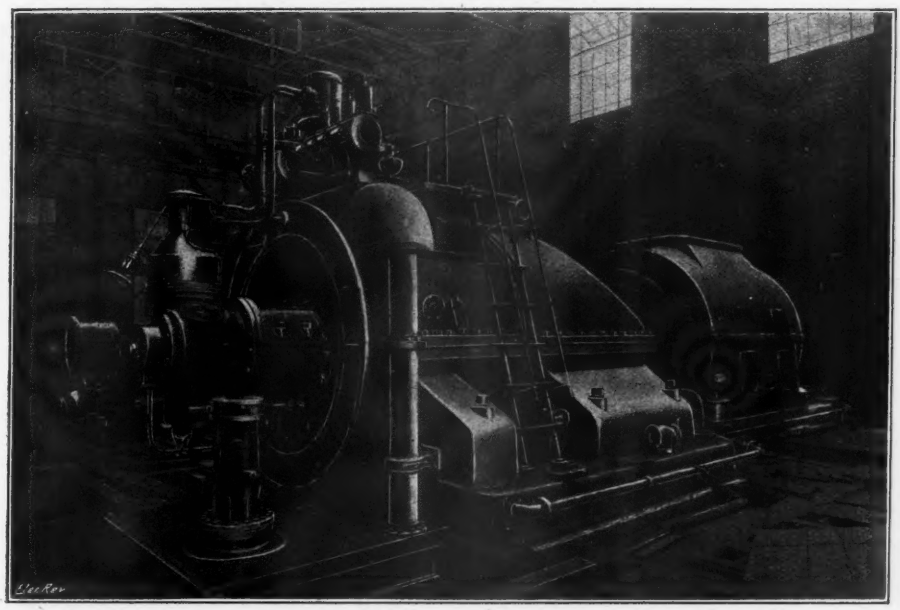


FIG. 3.—15,000-K.V.A. TURBO-ALTERNATOR DURING ERECTION, SIMMER PAN POWER STATION (see p. 108).

Like many other ideas, Mr. Turnbull's suggestion can only be tested by trying it on a practical scale. It seems not improbable that something might be made of it, and the experiment could easily be carried out on a plot of ground at no great cost, a control plot being, of course, provided for comparison. Our personal knowledge of agriculture being a negligible quantity, we cannot make any estimate as to the rise in temperature that would be required to produce tangible results, but from the engineering point of view, certain considerations appear to be fairly obvious.

In order to apply the heat to the soil to the best advantage, buried pipes should be employed in preference to open ditches, to prevent the loss of heat by evaporation and convection currents in the air over open water, which would be excessive. Ordinary drain pipes would serve, as the pressure would be trifling, and leakage at the joints might be not only harmless, but even beneficial. The system, if carried out on a considerable scale, might replace cooling towers, the piping being arranged so as to return the cooled water to the power station, and obviously, if the go and return conduits were laid side by side, a few feet apart, the heating of the soil on the whole would be fairly uniform. By suitable grading, the flow could be made gravitational, and very little pumping should be necessary. The maximum supply of heat would be available in the winter, when most needed, and the minimum in the summer.

Assuming that a large area of level land is thus piped, then, except near the boundaries of the area, the heat can escape in the vertical direction only. The earth being a poor conductor of heat, in the course of time the downward flow of heat would be limited by the establishment of a steady temperature gradient, for the determination of which data are available. The remainder of the heat would pass through the surface of the soil by radiation and by convection currents of air, also by evaporation of moisture; we know of no data as to the rate of loss of heat from the surface of soil covered or partly covered with vegetation, but some rough idea can perhaps be formed as to its order of magnitude. The loss of heat per sq. ft. per hour per deg. F. difference of temperature between the air on one side and that on the other of a 24-in. brick wall is 0.2 B.TH.U. If we suppose the pipes to be laid about 2 ft. deep, and the nature of the soil, its emissivity, &c., to be comparable with that of brick, we may employ this value for k in the equation:—

$$H = k A t \theta,$$

where H = heat lost in B.TH.U.,
A = area of surface in sq. ft.,
t = time in hours,
θ = temperature difference between the soil at a depth of 2 ft. and the air.

Taking A = 1 acre = 43,560 sq. ft.
t = 24 hours,
θ = 20° F.,

then H = 4,180,000 B.TH.U. per acre per day required to keep the soil 20 deg. F. above the temperature of the air.

Assuming, after Mr. Turnbull, that half the heat originally in the coal is transmitted to the circulating water, or, say, 7,000 B.TH.U. per lb. of coal fed to the boilers, the above quantity of heat would be available for every 600 lb. of coal consumed (neglecting for the moment the downward flow of heat).

In the case suggested by Mr. Turnbull, the consumption averages 1,000 tons a week = 320,000 lb. of coal a day, which divided by 600 gives 533 acres as the area that could be thus warmed.

According to Kennelly's results, quoted by Messrs. Melsom and Booth in the I.E.E. *Journal*, the conductivity of ordinary moist sandy soil may be put at about 0.29; taking a depth of only 10 ft., and a temperature difference of 10 deg., the loss of

heat by downward flow, when a steady state is reached, is .29 × 24 = 7 B.TH.U. per sq. ft. per day, or about 300,000 per acre, say, one-eighth of the total heat available. But if a sufficiently large surface were dealt with, so that the lines of heat flow were normal to the surface for a great depth, this loss would eventually become negligible, except near the boundaries of the area. How little it is may be deduced from the practice of making hotbeds with stable manure, a comparatively small quantity of which produces a remarkable effect for a long period. We may therefore take it that the great bulk of the heat will flow upwards.

The question arises whether it is sufficient to keep the soil warm; possibly it is still more important to warm the air over the soil, in which case a covering to retain the warmed air is essential. Already it is the practice for market gardeners to erect glass houses of enormous extent, the glass acting as a trap to retain heat, and clearly it would be to their advantage to do this over an area where bottom heat was available; this would entail no expense to the power suppliers, who, of course, would charge a rent to farmers or gardeners for the use of their waste heat. The alternative of using open ditches, in view of the great quantity of heat available, might serve to keep the air warm without a cover.

The cost of the piping would be set off against that of cooling towers, and the rent would go to cover any deficiency, any surplus being applied to increase the profits of the undertaking. With regard to the advantage of heating the ground in this way, we may cite the actual practice in Yorkshire of conducting the hot gases from furnaces through pipes buried in the ground for the purpose of forcing rhubarb. Large areas are cultivated on this system, although the coal has to be consumed especially for the purpose; and if the system pays under these conditions, surely it will pay still better where the heat is a waste product, which can be put to no other use owing to its low temperature. In all probability it would be possible to raise two crops, of suitable kinds, per annum with artificial heating.

If we could add to such an installation artificial fertilisers obtained from the by-products of combustion of the coal, it will be seen that we should have an exceedingly efficient all-round combination! The electrical engineer of the future might thus become, in addition to his present functions, a chemist and agriculturist, a prospect which some, no doubt, would consider appalling.

No doubt many objections can be raised to the scheme. The cost, even using cheap drain pipes, might prove to be inordinately great; the water might be insufficiently cooled, and so on. Our rough calculations are admittedly based upon very questionable assumptions, and may be very wide of the mark. However, our object in making these speculations is not to make predictions or to put forward accurate calculations, but to attract to this interesting subject the attention that, we believe, it merits, and to induce others, better qualified than ourselves, to investigate the matter. *In these days, we cannot afford to despise any possible source of economy.*

THE DIESEL ENGINE USERS' ASSOCIATION.

Tar Oils as Fuel for Diesel Engines.

At the July meeting of the Association the use of tar oils as fuel in Diesel engines was further discussed.

Mr. Napier Prentice (Felixstowe) gave his experience in regard to the use of tar oil, which he had obtained from a local distiller. He had found difficulty in obtaining quotations and in getting the work in hand of altering a Diesel engine so as to adapt it specially for the use of tar oil in the manner which had been successfully employed on the Continent, and he therefore decided to try the effect of using tar oil in one engine without any alteration. At about half-load he found this was not successful, as misfiring and a smoky exhaust occurred. He was advised to work with a sharp edge on the flame plate, and with this alteration and a slightly different quality of tar oil he obtained satisfactory results so long as the engine was not run below about three-quarters full load. The blast pressure at all running loads was maintained at five atmospheres below the normal pressure used when running with petroleum fuel oil, and the cooling water outlet was restricted so as to maintain a temperature of 125 deg. F., as against 110 deg. F. which had been maintained when using the other class of fuel oil.

Mr. F. Banks Warner gave some information as to the general position in regard to the question of obtaining suitable supplies of tar oils, including delivery on site. At the present time, the high railway rates for this class of business were a serious handicap to its development in certain parts of the country where local supplies were not available.

Life of Diesel Engine Crankshafts.

Mr. P. H. Smith read a paper on "Crankshaft Breakages in Diesel Engines," of which an abstract follows:—

All shaft failures that I have investigated owe their origin to lack of alignment of the main bearings. This is usually the result of unequal rates of wear of the several bearings supporting the shaft, though in some cases it can be traced to negligence during erection, or, in older engines, to defective foundations. So far as this paper is concerned, I am limiting my remarks to the case of bearings wearing away unequally on 4-cycle vertical engines.

The type of engine least liable to shaft-fracture is the 3-cylinder, and the worst is the 4-cylinder normally, though the 2-cylinder runs it a close second if fitted with a very heavy flywheel.

Almost without exception Diesel shafts have failed through the webs, the crack starting at the centre and working out-

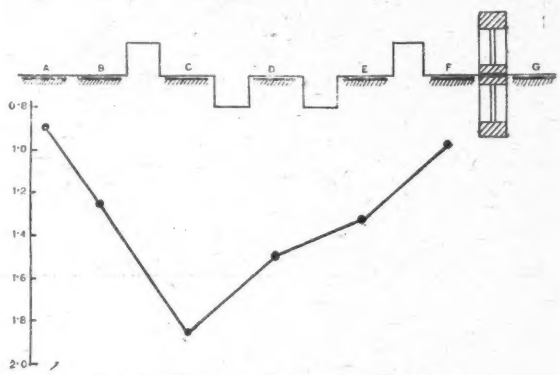


Fig. 1.—Wear of Crankshaft Bearings.

wards; the time elapsing between the first appearance of the fracture and its complete failure generally extends over many weeks.

As regards location of fracture, either web may fail in the single-cylinder units. In 2-cylinder engines, web 4 fails most frequently (the webs being numbered consecutively, commencing from the end further from the flywheel). In 3-cylinder units the fracture occurs either in web 1 or 6, and in 1 as often as 6. Sometimes both fail simultaneously. I have no knowledge of any other webs failing in a 3-cylinder unit. In 4-cylinder units it is, I think, an almost invariable rule that web 4 fractures.

I have pleasure in placing before you data carefully compiled and extending over four years of continual observation on two engines of the 4-cylinder type.

The plant was installed about nine years ago, and comprised two Continental engines of four cylinders each, the cranks being arranged as shown in fig. 1, viz., up, down, down, up, as contrasted with the usual arrangement in this country, up, down, up, down.

The cylinder dimensions were 415 × 600 mm., and the engines ran at 170 r.p.m., developing 320 b.h.p. each.

The flywheels weigh about eight tons each, and a bearing is interposed between the flywheel and a direct-current generator. Expressed in relation to the cylinder bore (D), the main dimensions of the shaft are:—Diameter of journals and crank pins, 0.53 D; thickness of crank webs, 0.265 D; length of pin, 0.53 D; length of main bearing, 1.1 D. The shaft is, therefore, on the weak side.

One engine broke its shaft about four years after its installation and the other after about five years. In both cases web 4 failed. These shafts were replaced by others obtained in England. The tensile strength of that now in No. 2 is about 32 tons, while in No. 1 it is 40 tons per sq. in.

The bearings were measured every year, and thus the actual wear has been regularly recorded for three and a half years in the one case and for four years in the other.

The curve, taken from No. 1 engine, explains why the 4-cylinder engine with this arrangement of cranks, fractures through the webs of the second cylinder. This curve is characteristic of 4-crank engines.

The engine was stripped right down; the bearings were found to have the metal loose and cracked, and the spare set was substituted. The shaft was bedded in the usual way up to a certain point, but, to complete the work, bearing C was left a shade high and bearing A was left a shade low. Finally the top caps were filed down, so that the journal ran in the bearing with running clearance only. Thus the perfect alignment of the shaft was assured, and before re-assembling the engine, we micrometered the thickness of metal on each bearing interposed between the shaft and bedplate. This has been recorded, and now from year to year we can re-measure this thickness, and so obtain the relative rates of wear in each bearing. That which is worn most will constitute the datum, and the data will show exactly how much must be scraped off the "high" bearings in order to re-introduce conditions of minimum stress on the shafts.

This system of assuring perfect alignment of the shaft will appeal especially to those engineers who have no reserve plant, and who have to get repairs done during the week-end.

As regards the subsequent adjustment of running clearance of main bearings, it is not usually feasible to measure this with feelers; where possible, I prefer to feel the lift in each bearing, and let the cap closer and closer until the bearing either heats (in which case scrape out the cap) or until the lift just disappears.

The original Diesel shafts were made in 32-ton steel to the following proportion:—

Diameter of pins and journals, 0.51 to 0.525 D.
Length of main bearings, 1.1 to 1.2 D.
Length of big-end pin, 0.51 to 0.525 D.
Thickness of web, 0.25 to 0.27 D.

The shaft I would propose, if my firm's system of re-alignment is adopted and your hearty co-operation is assured, is the following:—

Tensile strength, not less than 34 tons.
Ductility, not less than 25 per cent. in 2 in.
Diameter of pins and journals, 0.525 to 0.54 D.
Length of main bearings, 0.75 to 0.8 D.
Length of big-end pin, 0.525 to 0.54 D.
Thickness of webs not less than 0.32 D, but centre to centre of cylinder made minimum possible, and any excess over the proposed length of pin and journal to be put into the webs.
Fillets to be not less than one-tenth the diameter of the shaft.

This shaft is comparatively light, but it possesses the following advantages:—

1. The fuel consumption of the engine is reduced.
2. Initial cost and cost of upkeep is reduced.
3. The bearings will run cooler, other things excepting pressure per sq. in. being equal, for it is high peripheral speed rather than high pressure which causes bearings to heat.
4. Lubrication costs will be reduced.

However, the success or failure of such a shaft depends upon proper attention being given to its adjustment from time to time; if this is not given, it is merely a question of time before even the heaviest shaft will fail.

The Association will resume its meetings next October. Information concerning the Association can be obtained from the Hon. Secretary, Mr. Percy Still, 19, Cadogan Gardens, London, S.W.

TRADE STATISTICS OF INDIA.

THE following figures of the imports of electrical and similar goods into British India in the year ended March 31st, 1915, are taken from the recently-issued official trade statistics; details for the year ended March 31st, 1914, are added for purposes of comparison, and notes of any increases or decreases are given:—

	1913-14. £	1914-15. £	Inc. or dec. £
Brass, wrought.—			
From Great Britain ...	49,000	31,000 –	18,000
,, Germany	18,000	2,000 –	16,000
,, Italy	11,000	4,000 –	7,000
,, Other countries ...	31,000	30,000* –	1,000
Total	109,000	67,000 –	42,000

* Sweden £8,000.

Copper and copper ware.—			
From Great Britain ...	1,354,000	950,000 –	404,000
,, Germany	866,000	487,000 –	379,000
,, Belgium	61,000	12,000 –	49,000
,, France	170,000	126,000 –	44,000
,, Austria	3,000	2,000 –	1,000
,, Japan	274,000	254,000 –	20,000
,, Other countries ...	17,000	56,000 +	39,000
Total	2,745,000	1,887,000 –	858,000

	1913-14. £	1914-15. £	Inc. or dec. £
Iron wire.—			
From Great Britain ...	74,000	82,000 +	8,000
,, Germany	38,000	19,000 –	19,000
,, Belgium	15,000	7,000 –	8,000
,, Other countries ...	33,000	31,000 –	2,000
Total	160,000	139,000 –	21,000
Prime movers, other than locomotives.—			
From Great Britain ...	512,000	428,000 –	84,000
,, Germany	28,000	1,000 –	27,000
,, United States ...	7,000	10,000 +	3,000
,, Other countries ...	8,000	8,000	—
Total	555,000	447,000 –	108,000
Electrical generators.—			
From Great Britain ...	20,000	14,000 –	6,000
,, Other countries ...	1,000	1,000*	—
Total	21,000	15,000 –	6,000

* Belgium £1,000.

Electrical motors.—			
From Great Britain ...	83,000	74,000 –	9,000
,, Germany	5,000	1,000 –	4,000
,, United States ...	3,000	1,000 –	2,000
,, Other countries ...	2,000	3,000* +	1,000
Total	93,000	79,000 –	14,000

* Italy £2,000.

Other electrical machinery.—			
From Great Britain ...	195,000	243,000 +	48,000
,, Germany	30,000	6,000 –	24,000
,, Italy	2,000	4,000 +	2,000
,, United States ...	2,000	6,000 +	4,000
,, Other countries ...	3,000	1,000 –	2,000
Total	232,000	260,000 +	28,000
Mining machinery.—			
From Great Britain ...	64,000	49,000 –	15,000
,, Germany	2,000	— –	2,000
,, United States ...	28,000	48,000 +	20,000
,, Other countries ...	2,000	1,000 –	1,000
Total	96,000	98,000 +	2,000
*Machinery, other (except textile, agricultural, and printing).**—			
From Great Britain ...	753,000	563,000 –	190,000
,, Germany	64,000	22,000 –	42,000
,, Belgium	2,000	— –	2,000
,, United States ...	35,000	34,000 –	1,000
,, Other countries ...	33,000	17,000 –	16,000
Total	887,000	636,000 –	251,000

* The details for the two years are not strictly comparable, those for 1913-14 including some items which were not included in 1914-15.

Electric fans.—			
From Great Britain ...	32,000	28,000 –	4,000
,, Italy	16,000	10,000 –	6,000
,, United States ...	23,000	13,000 –	10,000
,, Germany	4,000	2,000 –	2,000
,, Other countries ...	7,000	2,000 –	5,000
Total	82,000	55,000 –	27,000
Electric lamps and parts.—			
From Great Britain ...	42,000	24,000 –	18,000
,, Germany	9,000	3,000 –	6,000
,, Austria	6,000	2,000 –	4,000
,, Japan	1,000	— –	1,000
,, United States ...	1,000	— –	1,000
,, Other countries ...	2,000	2,000	—
Total	61,000	31,000 –	30,000
Electric wires and cables.—			
From Great Britain ...	144,000	149,000 +	5,000
,, Germany	5,000	2,000 –	3,000
,, Belgium	3,000	— –	3,000
,, Other countries ...	6,000	2,000 –	4,000
Total	158,000	153,000 –	5,000
Other electrical instruments, apparatus, &c. (except telegraph and telephone materials).—			
From Great Britain ...	327,000	290,000 –	37,000
,, Germany	24,000	7,000 –	17,000
,, Belgium	2,000	— –	2,000
,, Austria	2,000	1,000 –	1,000
,, United States ...	52,000	19,000 –	33,000
,, Other countries ...	8,000	6,000 –	2,000
Total	415,000	323,000 –	92,000

	1913-14. £	1914-15. £	Inc. or dec. £
Scientific, &c., instruments.—			
From Great Britain ...	82,000	63,000	– 19,000
,, Germany	5,000	2,000	– 3,000
,, United States ...	2,000	1,000	– 1,000
,, Other countries ...	3,000	3,000	—
Total	92,000	69,000	– 23,000
Telegraph construction materials.—			
From Great Britain ...	7,000	18,000	+ 11,000
Telephone construction materials.—			
From Great Britain ...	22,000	17,000	– 5,000
,, Germany	1,000	—	– 1,000
Total	23,000	17,000	+ 6,000

In addition to the foregoing, the following were imported as Government stores:—

Instruments, apparatus, &c. (except musical).—			
From Great Britain ...	135,000	181,000	+ 46,000
,, Germany	1,000	—	– 1,000
,, Other countries ...	1,000	2,000	+ 1,000
Total	137,000	183,000	+ 46,000
Machinery.—			
From Great Britain ...	201,000	212,000	+ 11,000
,, Germany	1,000	—	– 1,000
,, United States ...	1,000	—	– 1,000
,, Other countries ...	1,000	1,000	—
Total	204,000	213,000	+ 9,000
Iron wire.—			
From Great Britain ...	12,000	10,000	– 2,000
Telegraph construction materials.—			
From Great Britain ...	97,000	102,000	+ 5,000
Copper and copperware.—			
From Great Britain ...	102,000	113,000	+ 11,000
,, Other countries ...	68,000	78,000	+ 10,000
Total	170,000	191,000	+ 21,000

NEW PATENTS APPLIED FOR, 1916.

(NOT YET PUBLISHED).

Published expressly for this journal by MESSRS. W. P. THOMPSON & CO., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford.

9,696. "Incandescent electric lamps." F. HARRISON & J. J. RUSSELL. July 10th.

9,697. "Shades or screens for electric lamps." W. FAWLEY. July 10th.

9,702. "Electric controllers." C. P. Elieson & E. G. Payne. July 10th.

9,738. "Machines for making electric cables, &c." MACINTOSH CABLE CO. AND P. W. SANKEY. July 11th.

9,742. "Portable electric lamps." F. WESTWOOD. July 11th.

9,745. "Electric couplings." ALLMANNA SVENSKA ELEKTRISKA AKTIEBOLAGET. July 11th. (Sweden, July 21st, 1915.)

9,749. "Spark plugs." G. BAYSDORFER & O. BAYSDORFER. July 11th.

9,750. "Electrical signalling or telegraphing systems." T. MCLEOD. July 11th.

9,753. "Transmitting gear of ships' telegraphic, &c., apparatus." G. W. HASTINGS, H. M. R. MADDICK AND A. ROBINSON & CO. July 11th.

9,760. "Towing ropes, wires or cables." CALLENDER'S CABLE & CONSTRUCTION CO. July 11th.

9,762. "Selenium cell." M. MARTINEZ & P. SALERNI. July 11th.

9,763. "Device for electric or magnetic registration of images." M. MARTINEZ & P. SALERNI. July 11th.

9,764. "Relay." M. MARTINEZ & P. SALERNI. July 11th.

9,766. "Regulators for polyphase transmission systems. BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.). July 11th.

9,774. "Reels for winding and unwinding coils of wire." F. J. BROUGHAM (A. W. Risher). July 11th.

9,776. "Automatic method of electrical heating." A. M. JANE. July 11th.

9,790. "Arc light stand." W. G. MOORE. July 12th.

9,804. "Electric lamp." H. S. GULSTON. July 12th.

9,812. "Regulators for polyphase transmission systems." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.). July 12th.

9,819. "Flanging glass tubes for electric lamps." J. A. ALLISON & MORRIS AND WHITHAM. July 12th.

9,825. "Electric accumulator containers." D. P. BATTERY CO. & B. M. DRAKE. July 12th.

9,826. "Time-limit electric relays." BRITISH WESTINGHOUSE ELECTRIC AND MANUFACTURING CO. July 12th. (U.S.A., July 12th, 1915.)

9,833. "Electric oscillating or wireless systems and apparatus." INDO-EUROPEAN TELEGRAPH CO. & H. R. RIVERS-MOORE, AND A. H. MORSE. July 12th.

9,848. "Electrolytic process for manufacture of metallic wire and strip." S. O. COWPER-COLES. July 13th.

9,850. "Electric time switches." A. M. COATES. July 13th.

9,860. "Method of electric bell alarm." J. FLEMING & W. W. KIRK. July 13th.

9,865. "Field telephones." L. P. LANGTON. July 13th.

9,866. "Electrical operating or controlling apparatus." T. MCLEOD. July 13th.

9,885. "Electric torches." H. GOLDSMITH. July 13th.

9,909. "Electrical terminal or connection." A. G. FRANCE. July 14th.

9,921. "Intercommunication telephone systems." J. W. DUNGEY. July 14th.

9,926. "Electric pocket lamps." M. STEINMAN. (E. Picard). July 14th.

9,927. "Producing asymmetric potential waves." BRITISH WESTINGHOUSE ELECTRIC & MANUFACTURING CO. July 14th. (U.S.A., July 14th, 1915.)

9,937. "Dynamo-electric gears of the unipolar type." M. BRESLAUER. July 14th. (Germany, July 10th, 1914.)

9,938. "Protection of electric transmission systems." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.). July 14th.

9,942. "Electrical resistance apparatus." P. H. DAWE. July 14th.

9,949. "Engine-room telegraphs." J. W. RAY. July 15th.

PUBLISHED SPECIFICATIONS.

1915.

7,979. PROTECTED OR ARMOUR-CLAD ELECTRIC SWITCHES. H. Berry & W. J. Markham. May 29th.

8,712. TELEGRAPH SYSTEMS AND APPARATUS THEREFOR. British Insulated and Helsby Cables, Ltd. & H. H. Harrison. June 12th.

9,282. MEANS FOR DRIVING DYNAMO-ELECTRIC MACHINES. W. Langdon-Davies, A. Soames & Naamlooze Vennootschap de Nederlandsche Thermo-Telephoon Maatschappij. June 24th.

9,345. ELECTRICAL SELECTORS OR IMPULSE RESPONDERS. Relay Automatic Telephone Co. & L. C. Bygrave. June 25th. (Cognate application, 17,956/15.)

9,527. ELECTRIC CLOCKS. W. H. Shortt. June 30th.

9,557. METHOD OF AND APPARATUS FOR CASTING SQUIRREL CAGES IN THE MAGNETIC CORES OF INDUCTION MOTORS. British Thomson-Houston Co. (General Electric Co., U.S.A.). June 30th.

9,684. GALVANIC BATTERY CELL OF THE MERCURIC OXIDE TYPE. J. N. Brönstead and Hellesens Enke & V. Ludvigsen (firm of). July 2nd.

9,836. ELECTRIC MOTOR CONTROL SYSTEMS. British Thomson-Houston Co. (General Electric Co., U.S.A.). July 6th.

10,330. PROTECTIVE REACTANCE COILS. G. Harlow. July 15th.

12,516. SWITCHES FOR RESISTANCES. L. Kamm. August 31st.

12,994. ELECTRIC ARC LAMPS. G. M. J. Mackay. September 10th. (September 12th, 1914.)

13,088. SPARKING PLUGS AND THEIR MANUFACTURE. K. E. L. Guinness. September 13th.

13,733. SPARKING PLUGS. V. Joly. September 27th.

15,460. ELECTRIC ADAPTORS. General Accessories (L. Rosenthall & C. Seymour, Transvaal). November 2nd.

15,539. ALARM FUSES FOR TELEPHONE, TELEGRAPH AND THE LIKE SYSTEMS. Automatic Telephone Manufacturing Co., J. Savin & S. R. Smith. November 4th.

15,681. OPERATING ROTARY CONVERTERS AND OTHER ALTERNATING-CURRENT MACHINERY. A. H. Railing & C. C. Garrard. November 6th.

15,863. ELECTRIC POCKET LAMPS. Dr.-Ing. Schneider & Co. Elektrizitats Ges. November 10th. (December 3rd, 1914.)

15,922. COMBINATION ELECTRIC TURN SWITCH AND WALL PLUG. C. E. Begg. November 11th.

16,349. ELECTRIC INCANDESCENT LAMPHOLDERS. C. G. M. Bennett. November 19th.

16,827. TRAYS OR RECEPTACLES FOR HOLDING ARTICLES. Automatic Telephone Manufacturing Co. & W. Rogers. November 30th.

1916.

1,248. MEANS FOR CONTROLLING ELECTRIC MOTOR CIRCUITS. Igranic Electric Co. (Cutler-Hammer Manufacturing Co., U.S.A.). January 26th, 1916. Patent No. 100,703.

1,300. APPARATUS FOR THE OBSERVATION OF AZIMUTH ANGLES AND THE SIMULTANEOUS ELECTRICAL TRANSMISSION OF THE VALUE OF SUCH ANGLES TO REMOTE INDICATORS. E. A. Graham & W. J. Rickets. January 28th, 1916. Patent No. 100,704.

4,688. ELECTRICAL SYSTEMS FOR ENGINES. C. F. Kettering & W. A. Chryst. July 16th, 1914. (Divided application on 7,758/15.) Patent No. 100,228.

5,085. MAGNETO-ELECTRIC MACHINES. J. W. Miller & M. Collard. April 6th, 1916. Patent No. 100,713.

6,042. DRY BATTERY. F. P. Baumann. February 4th, 1916. (Addition to 100,086.) Patent No. 100,714.

Nitrogen Fixation.—In *Nature*, of July 13th, there was reported the formation of a Swedish company to manufacture artificial fertilisers, such as ammonium nitrate, and other nitrogenous compounds, by chemical processes from easily accessible raw materials, without the aid of electricity. It is stated that the company is preparing to turn out large quantities of its products, and is increasing its capital from 3·7 to 8 million kronor. Apparently the new system will prove a serious rival to the electrical fixation of nitrogen.

Niagara Falls to be Flood-Lighted.—The City Council of Niagara Falls, N.Y., has authorised an expenditure of $10,000 for the illumination of Niagara Falls. The money is to be devoted to carry out the flood-lighting scheme submitted by the American Lighting Co., Chicago. For some weeks Will J. Davis, president of the company and inventor of the flood-lighting system of the American Lighting Co., has been making arrangements to illuminate the Falls, and for several nights previous to the action of the City Council a battery of 25 flood-lights was turned on the American Falls and the rapids of the Niagara River. The effect created was so far beyond the expectations of the promoters of the project, that the expenditure was enthusiastically approved, and it is now planned to double the number of lamps in service, and from time to time to add to the battery as new lighting effects are desired.—*Electrical Review and Western Electrician.*